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Steering Manufacturing Organizations towards Open Service Innovation: The Role of the Integrated Performance Measurement System

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Abstract

In the face of global competition and product commoditization, manufacturing firms are increasingly opening up to opportunities in the service markets. Despite the growing interest, many new product–service providers struggle to deploy open service innovation effectively, not least because they fail to change their performance management systems (PMS) to reflect the presence of service activities. This paper reports the results of an in-depth case-study research, which examines how manufacturers can steer their transition towards open service innovation using PMS. We suggest two performance measures: 'service coverage', which represents the proportion of customers who engage in service relationships; and 'service realization', which tracks the range of services designed to satisfy a customer’s needs. Not only are these two indicators complementary to traditional product business performance measures, such as market share, but the trade-off between them signals the transition that a product–service provider gradually makes from being oriented towards products and standardization to becoming focused on services and customers. Finally, the two service measures are supplemented with a 'complementarity index', which tracks the relationship between service and product business performance, focusing in particular on whether the relationship is reinforcing or substitutive. Combined, these three indicators allow firms to steer their service activities in an integrated and sustainable manner that creates value for the product–service provider as well as the customer.

Keywords: Open service innovation, Servitization, Performance measures
Introduction

Accelerating global competition, shrinking product innovation cycles and a growing number of imitators are a constant threat to modern manufacturing in the developed world. Looking for a way off this merry-go-round, companies are increasingly looking for innovation opportunities in the service markets that are related to the products. Aiming to improve customer value and experience and increase utility for the customer, manufacturers are adding services to their product offering. This strategy, coined by Henry Chesbrough, the open innovation guru, as open service innovation, already counts a number of well-known representatives, such as Rolls Royce and IBM. Moreover, recent data suggests that over one-third of large manufacturing firms now offer services, with the proportion increasing to almost 60 per cent in the United States. And while recently published studies are showing that open service innovation contributes to customer loyalty, sustainability of manufacturing and performance of manufactures, they also point to the challenges of adapting manufacturing organizations and management styles towards services. Given this shift, it may be also time to revisit the question of manufacturing measurement and to ask whether we have appropriate measures for tracking the performance of product–service providers.

This situation brings to mind the late 1980s, when a stream of literature questioned the relevance of accounting and measurement systems for manufacturing firms. Much of the original work questioning the relevance of traditional performance measures was set in the context of world-class manufacturing and the competitiveness and managerial practices of Japanese companies; authors pointed out that the nature of manufacturing had changed, yet the measurement systems employed had not. In many cases measurement systems were myopic – driving the wrong behaviours in modern manufacturing firms. Today we are witnessing a new shift in manufacturing – the shift towards services. Should we not revisit the performance measures for product manufacturers?
This question is particularly apposite given the interplay that exists between product and service sales; both activities can display a complementary, mutually reinforcing relationship, as well as a substitutive one. If managers and salesmen are too focused on product-based metrics (and evaluated according to them), will they be tempted to give away services to secure product sales, knowing that in doing so they will not adversely affect their performance measures?

Working in close collaboration with the top management of a global manufacturer turned product–service provider, Atlas Copco1, and the management of ten of their country subsidiaries, we examined the practices with respect to the design and use of performance measurement systems that help a manufacturing firm start a process of open innovation. Based on this analysis, we concluded that a future product–service provider should start by complementing its product-specific measures of business performance (e.g. market share) with measures that depict the success of service activities and explicitly acknowledge the interaction between product and service activities. The study resulted in some clear recommendations for manufacturers that contemplate implementing an open service innovation approach: adequate implementation requires an integrated set of performance indicators for products and services as well as their relationship; balancing different indicators leads to gradual and well-paced implementation of open service innovation, which in turn leads to further customer orientation as well as (open) product innovation.

**Importance of the performance measurement systems**

The importance of performance measurement systems (PMS) has been widely acknowledged. This importance pertains to all functional areas. At the same time, PMS may serve different purposes in an organization: PMS help to

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1 Atlas Copco is an industrial group with world-leading positions in compressors, expanders and air treatment systems, construction and mining equipment, power tools and assembly systems. With innovative products and services, Atlas Copco delivers solutions for sustainable productivity. The company was founded in 1873, is based in Stockholm, Sweden, and has a global reach spanning more than 170 countries. In 2011, Atlas Copco had 37 500 employees and revenues of BSEK 81 (BEUR 9). Learn more at [www.atlascopco.com](http://www.atlascopco.com).
formulate, communicate and implement strategy throughout the organization; they are used to control and influence behaviour in the organization and guide the strategic planning process. Finally, contributions point to the use of PMS to perform a more diagnostic control function through goal setting and measurement of actual results, as well as to incite organizational learning. In general, PMS are used by higher-level managers to steer the behaviour of the middle management and subsequent layers of the organization.

The question of whether manufacturing-based PMS are relevant and effective for service firms has been posed by several authors. Service productivity, service quality, customer satisfaction and provider–customer relations in general have remained central to service performance measurements, while more recently we have begun to see the necessity of measuring performance in service development and innovation. While these contributions have complemented PMS literature by proposing PMS for pure service providers, a considerable research gap still remains to be filled by designing PMS for product–service providers.

In recent years some studies have started to recognise this gap, largely by reporting on the adverse consequences of inappropriate PMS. One issue frequently discussed is that manufacturers seem to be reluctant to adopt service values and treat service activities as a business. This leads to a lack of defined business goals and, hence, a lack of measureable targets. According to some authors, prototypic manufacturing values often focus on efficiency, economies of scale, and beliefs that variety and flexibility are costly. On the other hand, service-oriented values embrace customization and beliefs that flexibility and variety create profits. Recent literature more directly identifies issues with current performance measures and offers some advice concerning the design of customer-focused performance measures for service-oriented firms. Objective measurements of effectiveness and efficiency need to be supplemented with subjective measures for assessing service experiences. In order to build a well-functioning service organization, firms hence need to develop indicators that measure customer satisfaction, employee satisfaction, and business success.
Additional suggestions on how to extend operational performance measures of product–service providers have been offered. For example, Cohen et al. (2006) propose two sets of relevant metrics: customer-focused metrics, such as the waiting times for technical assistance, diagnosis and the delivery of parts; and internally focused metrics, such as fill rates and parts obsolescence costs, which can quantify the way companies use their service assets. Further to that, business effectiveness measures, such as market share, cycle times and quality levels are deemed as product-oriented, and servitized manufacturers need to focus on measures such as profit per installed unit, share of customer's total downstream-activity spending and total customer return over the product lifecycle.\textsuperscript{xii}

Though prior literature offers examples and suggestions, we still lack consistent and integrated foundations for the design and deployment of a complete PMS for product–service providers that draw on all relevant performance perspectives. Moreover, the question remains: How should a product provider take those first steps towards open service innovation? What should be guiding them? As prior studies suggest that the first task of manufacturing services is to demonstrate their value for the manufacturer as well as for the customer,\textsuperscript{xii} we focused on revealing performance measures that track different aspects of business and customer-oriented performance and, therefore, help manufacturers to transition from product innovators to product–service innovators.

**Atlas Copco: Manufacturer turned product-service provider**

To understand the nature of service performance in an industrial, product-driven enterprise, we have engaged in a three-year-long study of a multinational equipment manufacturer, Atlas Copco Compressor Technique (the largest business of the Atlas Copco group that we will continue to refer as Atlas Copco). Throughout the course of the study, we have collected both quantitative and qualitative data that allowed us to understand how Atlas Copco designs and utilizes performance measures.\textsuperscript{xiii}
We have opted for an inductive case-study design given that the nature of the phenomenon requires disentangling complex interdependencies involving the nature of the underlying constructs and the subsequent design of performance measures, as well as the implications in terms of steering a business. To understand both phases – design and implications – we adopted a multilevel study design within one firm. The design of PMS was studied at the level of corporate headquarters responsible for defining PMS, while the implications were assessed through a study of sales and service subsidiaries that were responsible for the implementation of open service innovation and that used performance measures to steer the activities within their organization. Multiple, comparative case studies allow for replication logic and result in an enriched understanding of the dynamics at play.

The choice of the firm has been both deliberate and representative. Atlas Copco has been gradually innovating towards services over the last decade. While deploying service innovation, Atlas Copco achieved outstanding financial performance and has been significantly outperforming the competition (see Figure 1). In addition to their success, it was clear that they were conscious of the need to track service performance. Early on, Atlas Copco separated reporting of service sales and gross profits. They already had information systems that tracked performance of services. Senior management at headquarters was experimenting with the design and use of service performance measures.

Atlas Copco is active in more than 100 countries and employs over 30,000 people worldwide. Consolidated annual revenues exceed 4 billion USD, with the contribution of the service business amounting to around 40 per cent in 2007. The firm’s product offering encompasses an assortment of compressed air equipment that complement one another to cover a variety of industrial applications. For the majority of customers – mostly industrial manufacturers themselves – these products represent an investment, which will be part of their production units for a number of years. The whole range of products offers substantial potential for services.
To supply customers with their product and service offering, Atlas Copco operates through a network of sales and service subsidiaries. Each of the subsidiaries is headed by a general manager (GM), who is responsible for the provision of the entire product and service portfolio in a given country. In addition to geographical diversification, Atlas Copco is also divided into different business divisions, each of which represents a certain market segment (e.g. small equipment versus large equipment). Similarly, the subsidiaries are subdivided into ‘business lines’ that represent each of the divisions and have their own sales representatives and business line managers (BLMs) at country level. A BLM would report to his divisional head at headquarters level as well as to the country GM. Senior divisional management at (global) headquarters level would design performance measures for their respective divisions and define targets based on these indicators to the GMs. The GM’s success would be judged according to the performance achieved, using the same measures to steer actions within the local organization.

The first step in our research trajectory was to understand the purpose and design of service performance measures at headquarters level. The principal investigator had interviewed three vice-presidents for services, two vice-presidents for products in three different divisions, together with ten product and service managers.

The informants were instructive with regard to a) the constructs or the aspects of the business that they felt were important to be measured and b) their perspectives on performance measurement design, including potential shortcomings of the available performance measures. In parallel, the principal investigator had been collecting and analyzing the data that is used to develop these performance measures in order to understand whether there were any shortcomings to the way data was being collected. For this purpose, meetings with the financial director, head of accounting, three business controllers from the accounting department and four IT experts were organized.
After collecting and analysing information from headquarters, the focus of the analysis switched to the use and interpretations of performance measures within the subsidiaries. Interviews were carried out to understand managerial practices, including the implementation and use of performance measures at the level of subsidiary. Several ideas on how to approach and measure certain business objectives emerged at subsidiary level rather than from the headquarters. This period was intertwined with regular meetings with management at headquarters, where the principal investigator reported the study progress to the president for services on a monthly basis.

**From product heritage to open service evolution via measures**

*Heritage – product business performance measures*

Prior to turning towards open service innovation, most manufacturing firms would strongly focus on market share as an indicator of their product success. In the case of Atlas Copco, while some parts of the firm (e.g. R&D unit and factories) would have their distinctive performance measures, the business divisions responsible for customer contact via different product lines (e.g. small vs large equipment division) relied predominantly on market share to track business performance.

Divisional responsibility at headquarters level has imposed regular tracking of market share and introduced it in the incentive schemes of their country BLMs. Market share was also strongly reflected in the GM’s compensation. Market share was calculated at a very granular level, almost for each product type. Strategic choices, such as decisions with respect to the distribution channel structure (e.g. the number and choice of distributors) were optimized according to the impact on market share. Similar practices have been used to assign territories to salesmen and were reflected within the incentive systems.
Besides market share as a dominant KPI, the GMs and BLMs were also responsible for the overall financial performance of the country subsidiary. Full financial responsibility (in addition to market performance responsibility) encouraged entrepreneurial behaviour at subsidiary level and led to the development of local strategies. This process has encouraged the development of service activities at subsidiary level. Services first grew ‘locally’ and as they began to represent a lucrative support activity, they became a part of the formal strategy of the firm as a whole. A similar trend was replicated over the large majority of subsidiaries, with subsidiaries in developed European markets leading the way. The appearance of services as an autonomous and emergent strategy of subsidiaries later on translated to an induced service strategy pursued and reinforced by corporate headquarters.

**(Newly adopted) service business performance measures**

At the beginning of this decade, the idea of service as a lucrative activity, even a business, was adopted by many manufacturers, especially those that focus on durable goods. Firms such as Rolls Royce, Xerox, GE and others increasingly began to focus on the customer benefits achieved through services. Product–service provider benefits were expected to stem directly from the customer-minded approach, yet the approach that was taken to steer these firms towards services has been less well reported. Atlas Copco’s service approach evolved around two goals: first, to establish a service relationship with each of their customers; and second, to evolve towards a more elaborate and customized service offering for each customer, a process labelled 'climbing the service ladder'.

In order to promote services, headquarters introduced a reporting structure that tracks sales and gross profits separately for products and services, rather than having service contributions bundled with the product contributions. This, in turn, inspired managers towards the development of performance measures specific to service businesses. At the same time, while service sales and gross profit data

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2 Examples of the services offered ranged from spare-parts provision, ad hoc repairs of equipment, curative and preventative maintenance, total responsibility plans, monitoring, equipment and infrastructure optimization.
ensured a certain level of transparency, they represented merely a starting point – an input – for the development of market performance indicators. It took a considerable period of trial and error in approximate performance assessment of subsidiaries to eventually distil core business goals for services. This also represented the first step in shaping service performance measures. The two overarching goals that emerged can be described by the following questions:

- How many, or what proportion, of our (product) customers are also buying services?
- How well are we satisfying customers’ needs with services? Or: How well are we covering the service potential of an average customer?’

These two questions capture the underlying construct of performance measures that start to define the effectiveness of Atlas Copco’s service business. On the one hand, the two complementary constructs jointly assess to what extent the firm exploits its service market potential, taking the installed product base as a starting point. On the other hand, the constructs also highlight the trade-off that a manufacturer turned product–service provider faces: adopt a one-fits-all approach to services, following the product-based logic, or move towards the customized offering that fits better with service-dominant logic. In the sections that follow, we describe each of the two constructs and discuss the design and application of their measures.

**Service coverage**

Service coverage is the construct that answers the first question: What percentage of our (product) customers is also buying services? This ratio captures the extent to which an organization has established a service relationship on top of its existing product activities (expressed as a proportion of the installed base of products over a given time period).

As the installed base of products represents the main market for services, the rationale for the use of this indicator in tracking the performance of the service business is rather straightforward. Put simply, service coverage represents a service equivalent of the (product) market share and answers how well the service
business competes against other service providers who are targeting a manufacturer’s installed base of products (e.g. specialized equipment servicers, facility maintenance companies, competing product–service providers or even distributors). If the scope of the manufacturer’s service strategy extends to service opportunities of other product manufacturers, service coverage can be extended to encompass all the (competitors’) products in the market, rather than only own-brand products, or the indicator may simply be allowed to surpass 100 per cent.

Service coverage represents an important indicator from the perspective of the product business strategy as well. Given that product lifecycle is usually lengthy, service encounters are the only point of contact between the manufacturer and its customer throughout this time. For products, service coverage represents a measure of the relational strength with the customer base and a safeguard against product competition.

**Service realization**

Service coverage answers the question: What part of the installed product base do we cover with services? Service realization, on the other hand, attempts to answer a complementary question: How well are we covering the service needs of those customers with whom we have established a service relationship?

Subsidiaries routinely selling more elaborate services contracts like, for example, total responsibility plans or performance-based service plans, would be doing a good job of covering customers’ needs and optimizing the functioning of their machines. High coverage of a customer’s needs would also imply high capture of market potential and therefore high service revenues. On the other hand, subsidiaries that confine themselves to the provision of spare parts, leaving it to the discretion of customers how to further service their equipment, cover only a subset of customers’ operational needs and hence capture a lower portion of the service market potential and generate less service revenues.
The price level of the service offering is another important factor of service realization, given that the ‘intangibility’ of services invites varying practices in service pricing. For example, a couple of subsidiaries occasionally underpriced their service offering to promote products that these services accompanied. Subsidiaries using this practice wouldn’t be able to reach high levels of service realization, even if they sold comprehensive services. These practices often went unnoticed by headquarters: while they could easily monitor product sales’ pricing through the transfer price mechanism, the pricing of services was largely in the hands of the subsidiary management (as was the production of services).

**Measure of interdependencies between products and services:**

*complementarity index*

By complementing its existing measure of product performance, market share, with new measures of services performance – service coverage and service realization – Atlas Copco adopted a performance measurement system that tracks the performance of service activities building on the installed product base. At the same time, these indicators do not fully account for the nature of the relationship between product and service offering.

The complexity of product–service relationship stems directly from the presence of both complementary and conflicting forces. More specifically, if one considers product and service activities over the product’s use, it becomes apparent that the nature of the relationship between products and services depends on the type of service offering and the phase of the lifecycle. Pre-sales services like, for example, consulting, design, customization, installation and transport are enabling product sales – provided that they are of satisfactory quality. Similarly, services that accompany the product sales process, such as financing and leasing, also facilitate the sales of products. Certain types of after-sales services that are focused on optimizing customer’s operations – rather than the product directly – have a similar positive impact on products. These services could be directly targeting energy costs, risks of downtime and other costs associated with product
functioning. Examples of these services include monitoring, energy and resource scans.

Finally, after-sales services that directly target functioning of the product usually represent the most dominant category. In the short term, services such as repairs and maintenance, for example, support product business by helping to promote and sell products. In the long term, they support the manufacturer in three ways. First, provided that the quality of servicing satisfies the standards, customer satisfaction increases the chance that the customer will choose an existing provider for the replacement of his/her asset. Second, a presence at the customer’s facility increases the chance of selling additional, related products. Third, a presence at the customer’s facility increases the chance of replacing equipment from other manufacturers. In this sense, one observes complementarities between product and service activities.

However, the story doesn’t end here unfortunately. Further inspection of after-sales services suggests a gloomier outlook. While bundling products with maintenance may increase the likelihood of selling subsequent to the first product, the maintenance’s primary objective is to postpone the purchase of subsequent products, thereby directly affecting product business in the next period. This substitution effect increases with the complexity and sophistication of services offered: while replacement parts and consumables are sold directly for the replacement of the miscellaneous parts of the asset, comprehensive overhauls – especially at the end of the lifecycle – postpone the replacement of the product.

Looking closely at services, the story becomes even more complex. Existing products represent the base for service and a direct source of service potential. In addition, manufacturers might be able to introduce product process innovation and work towards more cost-efficient products, which lowers the relative attractiveness of servicing in comparison to purchase of a replacement product. Hence, simultaneously offering products and services does not only imply the presence of – positive – spillovers between both activities; substitution effects will be – to some extent – present and might even prevail in organisations that don’t communicate
the importance of collaboration and efficiently manage incentives of representatives of both businesses.

An empirical analysis within the company under study, Atlas Copco, reveals that overall a positive relationship between products and services prevails. However, the complex and potentially conflicting nature of their relationship can stimulate short-term trade-offs and sub-optimization and hence needs to be monitored at the level of individual subsidiaries.

To design an indicator, and thus provide the firm with a formal approach to monitor interdependencies between the two businesses, insights stemming from an analysis of the sales processes – the critical point where synergies and conflicts usually arise – turned out to be highly relevant.

When two businesses nurture a good relationship, they manage to capitalize on numerous cross-selling opportunities. For example, the product salesman will inform the service salesman about the product he/she has sold so that the service salesman can follow up with his/her offer. At the end of the lifecycle, the service technician and the service salesman will make a joint assessment about when it is optimal for a customer to stop servicing and replace the existing product with a new product. They will inform the product salesman, who will follow up with his/her offer. Multiplied by thousands of customers and interventions a year, a good relationship between the two businesses will lead to complementarity and sales will co-develop.

On the other hand, the product and service salesmen can also play ‘tit for tat’ games. For example, if a product salesman decides to optimize his/her sales offer and price by arguing that the product doesn’t need any servicing, he/she will fail to promote service sales and may even intentionally block them. Similarly, the service technician and salesman can propose endless makeovers of an old machine, even when it is beneficial neither to the customer nor the manufacturer overall (when both product and service objectives are accounted for). In this case, product sales will be associated with a decrease in service sales and vice versa.
Given that a good relationship implies co-development and a bad relationship implies mutual exclusion or substitution, the nature and extent of interdependencies can be captured by means of a correlation coefficient that reflects the co-evolvement (or the lack thereof) between product and service sales, a so-called 'complementarity index'.

Firms that nurture complementarities between products and services should promote, rather than hamper, each other's sales and, hence, achieve positive values. On the other hand, firms that are letting substitution supersede complementarity will exhibit a negative score. Finally, scores around zero are also important signals, as they reveal that potential spillovers are actually not being enacted. Once we calculated correlation indices between product and service sales for the 2001–2007 period, we were able to assess the direction and the extent of interdependencies between the two activities for each subsidiary.

Subsequent case-study research revealed the correspondence between the complementarity index and the presence (or absence) of integrative mechanisms: subsidiaries with a high positive index achieved integration and nurtured good relationships between the product and service area, while for subsidiaries with a high negative index there would be conflicts between the two businesses.

**Measures in use – the need for integrated view and the dangers of ‘isolated’ indicators**

**Integrated view of performance indicators**

Together, the three service-oriented performance measures presented earlier complement product-oriented performance measures, such as market share, to cover the market performance of a product–service provider. Service coverage and service realization reveal the performance specific to the service market, while the complementarity index depicts the actual nature of the relationship between product and service businesses.
Joint representation of service coverage and service realization in the form of a matrix helps to visualize the state of the service business and its relation to product business (Figure 2). This ‘open service innovation matrix’ also allows Atlas Copco’s management at headquarters level to craft specific development targets for each of the subsidiaries according to its actual performance profile.

Subsidiaries in the bottom-left corner clearly need to ‘grow’ in terms of service activities. Though the growth trajectory is left to the discretion of a subsidiary, service business development almost naturally starts with the attainment of service coverage based on basic service offerings, and then progresses towards higher levels of service realization through upgrades of this offering. The subsidiaries that have already achieved high(er) service coverage, but have low levels of service realization, can be found in the bottom-right quadrant. Their ‘growth’ mission implies achieving higher levels of customer intimacy by offering more sophisticated services to their broad service customer base.

On the other side, subsidiaries in the upper-left corner achieved high service realization by offering sophisticated services but only to a subset of clients. These units will be encouraged to forge relationships with more customers, even if they have to do so by starting to offer more basic service packages.

Finally, subsidiaries in the upper-right quadrant have attained service business targets, but are at the same time reaching the point of saturation within the existing, integrated, service business model. These subsidiaries have managed to cover most of the existing installed base of products with sophisticated services, and the creation of new growth opportunities requires certain changes to the existing business model. To continue the growth trajectory within these subsidiaries, the manufacturer is ready to evaluate other innovation options, such as further open innovation of products based on service experiences, or even contemplate open service innovation in unrelated areas. An alternative could be to instruct these subsidiaries to focus on process innovation and concentrate on achieving higher profit margins – a strategy advisable in saturated markets.
Besides the position on the matrix, which reveals the state of the service business, it is important to keep track of the nature of the relationship with the product business, depicted by the colour and mark of the subsidiary. While a positive relationship reinforces market success on both the product and service side, negative interdependency can be an early sign of a conflict between the two businesses, which can eventually lead to the erosion of both businesses.

**Isolated use of performance indicators**

The open service innovation matrix offers a comprehensive picture of the service-oriented performance of manufacturing firms. Nevertheless, the importance of this integrated view becomes fully visible when one acknowledges the potential dangers of using performance measures separately.

Use of a performance measure in isolation creates issues because each of the measures sheds light on a separate aspect of performance and calls for actions that remedy that performance aspect specifically. Not only does this isolated focus on a performance measure lead to a neglect of other performance aspects but the optimization of one performance area can sometimes turn out to be at the expense of another performance area. For example, to optimize service coverage alone, a service BLM would prefer a basic one-size-fits-all service offering (e.g. spare parts or repairs) offered at competitive (low) prices. On the other hand, boosting service realization alone would require an entirely different set of strategic choices. First, pricing schemes should be set relatively high, in order to achieve considerable levels of service revenue. Second, optimizing service realization is probably easier to accomplish by focusing on a small/limited number of highly lucrative clients; which contrast with the large-scale approach aimed for with basic service offerings.

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3 One may envisage representations that, in addition to the direction of the relationship, also depicts its strength.
To sum up, by being presented with a performance measurement system that incorporates potential trade-offs, subsidiaries are forced to look for a business approach that balances breadth of service coverage with depth of service realization. In order to achieve this optimum, a handful of subsidiaries decided to consecrate time and resources to perform customer base segmentation. This in turn allowed them to understand which customer segment offers the potential to increase breadth through 'economy offering', characterized by low price and basic services; and which customer segment can offer depth through premium service offering.4 At the same time, it is important to mention that one organizational factor facilitates adequate implementation of the two service performance measures. As the responsibility for performance measured by the two relatively opposing indicators rests upon one and the same manager, the service BLM, that optimal reconciliation is more likely to occur.

This last observation brings us to the need for concordance of service performance measures with product performance measures. Besides the complex relationship described earlier, the fact that service and product business performance fall under the immediate responsibilities of separate managers (product and service BLMs) is another reason to consider the complementarity index as one of the crucial measures of overall business effectiveness.

As the product BLM is rewarded mainly on the basis of product performance and the service BLM is rewarded mainly on the basis of service performance, by acting at the level of their individual goals and objectives, representatives of one or the other business could take daily decisions that jeopardize the other activity and/or sub-optimize returns for the overall firm. Given that the relationship itself might imply value creation or value destruction, it is necessary to monitor it.

To assess the relevance and implications of use (and abuse) of the integrated PMS, it is instructive to have a look at several subsidiary examples that illustrate

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4 For a more detailed account of the relevance of segmentation in this respect, see De Smet, Van Dierdonck & Van Looy (2003).
the performance outcomes arising from a neglect or overemphasis of different types of performance measures.

**Over-focus on market share and service coverage**

Firms that focus very strongly on market share while neglecting any aspect of service performance miss the opportunity to capitalize on the service market potential. More specifically, over-focus on market share may prompt them to sell very basic services and to give service offering at a discount, in order to sell products more easily. Organizationally, this strategy has been observed when general management of the subsidiaries is ‘product focused’, i.e. favouring the performance of product activities (over service activities).

**Over-focus on service realization**

Product–service providers may also go too far too quickly in the other direction. For example, guided by the best intentions to adopt open service innovation, two subsidiaries have concentrated on sophisticating offerings only. Over-focus on service realization made the subsidiaries concentrate on top-tier customers, trying to supply them with a state-of-the-art service offering. In comparison to this, basic service offering seemed less interesting and less lucrative and the subsidiaries wouldn’t go the extra mile to design and implement a sales strategy that would suit ‘cost-sensitive’ customers. This practice led to lost opportunities to develop lower customer segments bottom-up, starting from basic services to more sophisticated ones.

**Lack of focus on the complementarity index**

Further to the emphasis placed on different product or service performance measures, there were differences across subsidiaries with respect to the attention they paid to the complementarity index. Some subsidiaries have regarded the relationship between the two businesses as a black box; the GM would independently communicate with product and service BLMs, who would in turn
manage their businesses separately. Once the complementarity index was calculated, it revealed differences between the subsidiaries. The ones that nurtured the product–service relationship had a highly positive correlation index, while the ones that neglected this relationship and allowed trade-offs to occur had a highly negative index. Within subsidiaries that had a complementarity index close to zero, the two activities did not hamper each other; at the same time, cross-selling opportunities were not being grasped.

Discussion and conclusions

Why are measurements central to the first steps of open service innovation?

The aim of this study is to offer an integrated perspective on business performance measurement for manufacturing firms that start to engage in open service innovation. According to our research, service-related market effectiveness represents a critical performance aspect for two reasons. First, for services to be accepted as a business and to merit subsequent investments rather than be treated as a support function, they first need to demonstrate value potential. Second, possible conflicting objectives of products and services require PMS that capture the nature of interdependencies between the two activities.

The research on both the design and use of PMS suggest that crafting an encompassing PMS that integrates both product and service perspectives is crucial for the success of the product–service provider. We find that two indicators, service coverage – breadth of service presence – and service realization – depth of service presence – capture service value and complement market share as an indicator of product market effectiveness. In addition, the complementarity index assesses the quality of the relationship between the two businesses and the nature of the interdependency that they conceive.

The first priority for the top management that seeks to develop the service business is to understand and raise organizational awareness of the relevant
performance constructs. Knowing each aspect and all of the important performance aspects that should be measured is of utmost importance as assessing only a part of performance may lead an organization to focus only on a subset of goals and consequently to achieve suboptimal results. Furthermore, in the process of implementation of a service business model (as well as any new business model), transparency is the key ingredient of decision-making. Consider, for example, a service manager asking for a budget for investments in new service equipment or training; being able to demonstrate current performance and potential is key to assuring the necessary funds. Finally, accurate service performance measurements are necessary to properly devise appropriate reward systems for salesmen. A salesman that is offered a fair commission on products as well as services will be less likely to give away service to sell a product or under-represent a need for servicing while selling a product, and thereby hurt service business prospects.

Open service innovation continues towards customer orientation and product innovation

As they implement open service innovation, manufacturers may find themselves more aware of the need to be customer-oriented. Soon after starting to approach their service business in a comprehensive way, Atlas Copco’s management became more aware of what happens on the front line. A focus on the front line, in turn, amplified the need to focus more attention on customers, and the management decided to become more proactive in tracking customer satisfaction. Appropriate investments were made and the system to track customer satisfaction with different aspects of products and services has been implemented in the subsidiaries. As the customer surveys started to indicate, services had a decisive impact on the customers’ perception of the Atlas Copco brand. After the customer satisfaction project was completed, the management started to prepare to adjust reporting in order to be able to track the lifecycle value – which consisted of products and services – for every individual asset. The measurement of the lifecycle represented the next frontier in understanding the value that products and
services create for the company as well as from the customer with the implication to spur radical innovations in both products and services.

Finally, open service innovation – and potentially resulting customer-orientation – may lead to new product innovation ideas. At Atlas Copco, further investments in the service systems have also started to capture insights of relevance for the product business. For example, service technicians make comments on the serviceability of the products or any improvements that could be made in product functioning. A customer satisfaction survey also resulted in insights for further product improvements. Gradually, organisational links between the service organisation’s technical support team and the R&D division started to develop to ensure that the knowledge is shared. In this respect, our preliminary observations suggest that a measure of service innovation (e.g. a composite index of various investments in service capabilities and systems) should complement standard R&D-based product innovation measures. Similar to the case of business performance, firms should probably also monitor the links between product and service innovation activities, in order to maximize positive spillovers. As such, open service innovation and open product innovation begin to represent a value creation engine with double gears: on the front line and in the back office.

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Steering Manufacturing Organizations towards Open Service Innovation: The Role of the Integrated Performance Measurement System


Figures

Figure 1: Atlas Copco’s financial performance overview

![Atlas Copco's financial performance overview](image1)

**ASSOCIATION:**
- **Green Line:** Atlas Copco sales (mil USD)
- **Blue Line:** Peer group sales (mil USD)
- **Red Line:** Atlas Copco EBIT margin
- **Purple Bars:** Peer group EBIT margin

**X-axis:** 2001-2007
**Y-axis:** 0-25.0%

Figure 2: Service performance of subsidiaries

![Service performance of subsidiaries](image2)

**MISSION:**
- **Customer contact**
- **Efficiency? Innovation?**
- **Growth**
- **Customer intimacy**

**Legend:**
- Positive complementarity index
- Negative complementarity index