

## ROLE CONFLICTS IN R&D UNITS UNDERGOING PSS TRANSITION

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### ABSTRACT

Recent trends in manufacturing industries, is the movement of firms towards providing industrial services or product-service systems (PSS). Importance of this phenomenon has been acknowledged as imperative for strategic differentiation, maintaining competitiveness, increase profitability and be environmentally sustainable. Although a lot of studies have focussed on the benefits of PSS provision, yet very less is know about the challenges of such transition, especially at the functional unit level within an organsiation. Our study focusses on the R&D unit and the various role conflicts that emerges as the function of the unit moves from being based on legal structure to that based on collegial authotiry in the PSS transition process. In a cross-case analysis of large manufacturing companies involved in PSS transition, we identified how role conflicts occur at the organisation, unit and intra-unit levels. Our findings contribute to role conflict literature and in the context of PSS and R&D units. We also observe that role conflict operates not just at the individual member level but at various levels within the organisation and the R&D unit, which has not been observed previously. We contribute by showing that an understanding of these challenges can be the differentiating factor for successful implementation and managing transition towards PSS that have been previously neglected in PSS and R&D literature as well.

**Key words:** R&D, Product-Service Systems, Role Conflict, and Organisational Change

### INTRODUCTION

Markets today have become highly complex, competitive and constantly changing (Gebauer *et al.*, 2011). As a response manufacturing companies are increasingly adding more services to their products to offer product-service systems (PSS) in a bid to add greater value for their customers (Baines *et al.*, 2007; Neely *et al.*, 2011). It is also argued that offering a more customer centric need based solution (Mont, O., 2002; Tukker and Tischner, 2006) is imperative for businesses today for

strategic differentiation, maintaining competitiveness, increase profitability and be environmentally sustainable (Mont, O., 2002; Tukker, A., 2004; Baines *et al.*, 2007). This shift to a PSS approach, as opposed to a pure product-oriented manufacturing approach, comes with a lot of challenges (Baveja *et al.*, 2004). The companies seeking to make such a shift must engage in an organisational transformation in the way it creates, delivers and captures value (Parida *et al.*, 2014). This requires the development of new processes, routines and capabilities for the companies. Recent studies have been focusing on various aspects of this change required in a manufacturing company for it to be able to successfully offer PSS ranging from new business models (Lindahl *et al.*, 2009), operations management practices (Smith *et al.*, 2014), after-sales marketing (Cohen *et al.*, 2006) to service profitability (Neely, A., 2008). However, few of the previous studies have specifically focused on the role of R&D organization and the challenges it faces as manufacturing companies changes their orientation toward PSS provision.

Organisational change is a complex process that affects various levels of an organisation and has been studied widely by scholars (Hannan & Freeman, 1984; Greenwood & Hinings, 1996). Some scholars have shown that organisational change could lead to role conflicts for individuals in an organisation (Floyd & Lane, 2000; Baillien & De Witte, 2009). However, not much is known of how role conflict manifest at the organisational level or in the context of a unit within the organisation. The PSS transition process, is a good example of an organisational change process, when the company goes from being a provider of products to product-service systems. For a functional unit, like R&D in the organisation, this could mean a major departure in its way of functioning involving changes in its research and development processes, structure, managerial processes and skill sets. It could also involve significant change within roles, activities and actions for the R&D unit. In our research about the challenges that an R&D unit face during this change process, we stumbled onto a fascinating story about the emergence of role conflicts in such transformation processes. This was observed to be true at not only the individual level but also at the R&D unit and organisational levels.

In this research we believe our main contribution is about explaining the emergence of role conflict in PSS transition and how it plays out for the R&D unit. By doing this we both contribute to the existing works about challenges for R&D unit in a new context of PSS. We also identify new constructs, which is organisational role conflicts and how they play out in PSS transition. This has significant implication for organisational practice of R&D and R&D management literature. We believe that role-conflicts are the major challenges for R&D unit to cope with in the context of transition to PSS.

## **THEORY**

### **PSS transition and organisational change**

In today's competitive landscape for businesses, industrial firms are moving towards offering services to maintain their competitive advantage (Baines *et al.*, 2007; Neely *et al.*, 2011). In this transition from offering products to services, an organizational change to combinations of products and services is known as a PSS transition (Smith *et al.*, 2014). The underlying assumption of a PSS transition is that the customer's value of a product lies in the benefit it provides rather than owning the product. Therefore the focus shifts from the means of achieving the end benefit to the benefit itself. The form of a PSS varies in the entire spectrum of combinations of products and services

bundled together to deliver the end benefit. This transition towards offering PSS for manufacturing firm is inherently complex and likely to influence roles and expectations in the unity of command at organizations. The transitional complexities extend across product extensions, capabilities, competition, networks, financial flows, contracting, risk, technological complexity and transformational process. This makes the development of products and delivery of the same more complex to manage and co-ordinate. Therefore PSS provision is an example of a deep-seated organisational change process that can cause conflicts in the organisation. Offering PSS requires change across various established processes and at various levels. This could lead to complex scenarios for an existing unit or individual in the firm and lead to conflicts in what is to be expected. Though most functional units have been studied in the context of PSS transition, however, very little is known of PSS transition in the context of R&D units and organisational change and its management. We do not yet know how organisational change unfolds and manifests itself in the context of PSS provision in an R&D unit and what challenges it faces

### **Role conflicts, Organisational change and PSS transitions**

Role conflict has been defined as “the simultaneous occurrence of two (or more) sets of pressures such that compliance with one would make more difficult compliance with the other” (Kahn *et al.*, 1964, p. 19). In the organisational context, classical organizational literature tied to role theory suggests that the principle of unity of command has implications for role conflict in complex organisations. The principle of unity of command states that for any action an employee should receive orders from one supervisor only, and that there should be only one leader and one plan for a group of activities having the same objective (Rizzo *et al.*, 1970). This implies that the structure of the organisation will prevent an employee from multiple sources of command or expectations. However, organisations frequently violate this principle of unity of command. This is because multiple sources of authority exist when the organisation discipline is based not only on the position of power enforced by legal and formal sanctions, but also on professional expertise, which is enforced by collegial authority (Blau and Scott, 1962). This could be a classic example of emergence of role conflict in an organisational transformation in PSS provision context. Katz and Kahn (1978, p.197) state that “the process of organisational role-taking is simplest when a role consists of only one activity, is located in a single subsystem of the organisation, and relates to role-set all of whose members are in the same organisational subsystem”. Given the complex nature of PSS development and transition, which is an example of a typical organisational change process involving spread out teams, multiple chains of command and functional matrix structure of organisations, these conditions can hardly be met and organisational members often face different and conflicting expectations from a diverse group comprising of internal as well as external stakeholders. Therefore as role theory predicts, these office holders will face considerable role conflicts in their organisation (Rizzo *et al.*, 1970).

Most role conflict research traditionally has been focused at the individual employee and in challenges and resultant effect due to them. Very little is known of role conflict in the organisational context especially at a unit or higher levels of organisation. Shenkar & Zeira (1992) define role conflict at a system level as “ a situation in which the priorities of one system conflict with the priorities of the other systems”. Examples of such a system could be a functional unit, group, project team or subsidiary in an organisation. However very little research is available in relation to role

conflict at a system or more aggregated levels in the organisations. Also in the context of PSS transition, there is very little research on role-conflicts and its management

### **R&D unit, PSS transition and role conflict**

The primary function of R&D unit is to develop new products or discover and create new knowledge about scientific and technological topics for the purpose of uncovering and enabling development of valuable new products, process and services. This means that the R&D unit has to constantly interact with both external and internal elements to effectively deliver its role (Tushman, M.L., 1977). Therefore the R&D unit as a boundary spanning organisation has to deal with a variety of internal as well as external stakeholders which are evolved specialized units which speak a different language and have established processes (Katz and Kahn, 1978; Tushman, M.L., 1977). This could result in a lot of communication and process misalignment, which could lead to conflicts affecting the work performance adversely (Baker *et al.*, 1967; Allen, T.J., 1964). In the scenario of PSS transition, when the organisation is undergoing a change, the R&D unit is likely to face a high degree of complexity in its way of functioning which would lead to a lot of challenges in its management. However, not much research has been done to understand these challenges in an R&D unit in the context of organisational change such as PSS Transition.

### **RESEARCH APPROACH AND METHOD**

The present research involved, five Swedish manufacturing companies presently offering PSS to their customers. These companies hold the ambition to further extend their PSS offerings in the market place and be front-runners in their respective industries. Each of these companies in our research has decided to adopt a strategy to move towards offering PSS and is already engaged in the process of implementing this transition. We adopted an inductive and exploratory case-study-based research design because we wanted to obtain a rich data set and detect the underlying dynamics of the phenomena under investigation (Eisenhardt, K.M., 1989; Siggelkow, N., 2007).

#### **Data collection**

Data for the study was gathered primarily through in-depth interviews, as they provide insightful information and can be focused directly on the research topic (Yin, R.K., 1994). A total of 20 semi-structured exploratory interviews were conducted with managers across all levels of the R&D units of the respective companies who were either driving internal efforts in this direction or had a holistic view of the functioning of the R&D units and the companies PSS strategy. Initially the interviews were about the generic challenges in the R&D organisations and initiatives to overcome those challenges in the PSS transition context. The interviews were semi-structured and guided by a list of questions designed on the basis of the literature review in order to capture the challenges faced and response strategies adopted by the organisation and the unit in PSS provision. Later as themes emerged, more structured and direct questions on role conflict, and ambivalent responses were asked of the respondents in secondary and tertiary interviews. The interviews ranged from 60 to 90 minutes, with an average of 75 minutes. To ensure reliability multiple investigators conducted most interviews. All interviews were recorded and transcribed and then discussed within the group. To create overlap between data collection and data analysis, frequent discussions among the authors were held as well as continuous taking of field notes.

Each interview was summarized and transferred into a spreadsheet for further analysis to help us find patterns, which might have been difficult otherwise (Miles and Huberman, 1994). To further increase reliability by enhancing transparency and future replication, a case study protocol was constructed together with a case study database, containing case study notes, documents and analysis all with the aim of facilitating retrieval for future studies.

### Data analysis

An inductive analysis of our data was done as we progressed through our collection process. We followed a naturalistic enquiry method (Lincoln & Guba, 1985) and constant comparison techniques (Strauss & Corbin, 1990) to identify relevant analytical themes. Thereby our analysis progressed through a series of iteration building upon differences and commonalities between first-order categories, second-order themes and third-order dimensions (Nag *et al.*, 2007; Van Maanen, J., 1979). Though iterative in nature our analytical procedure can be seen emerging in distinct steps.

We first systematically coded the verbatim transcriptions using terms, labels and phrases offered within statements into codes across informants that were similar in their essence. These codes were then collapsed into the first-order categories (Van Maanen, J., 1979). We then started to analyse and see relationships and patterns amongst these first-order codes and aggregated them into theoretically distinct second-order themes. Representative data corresponding to second-order themes are shown in table 1. As a final step, we developed a more abstract overarching third-order dimensions arising out of the second-order themes.

To ensure rigour and increase confidence in our analysis and assignment of codes, we used multiple members of our group to develop the coding scheme independently. In the event of a disagreement or difference, we discussed and modified the coding scheme until consensus was reached.

**Table 1.** Second order themes and exemplary quotes

| Second Order Theme   | Exemplary Quotations   |
|--|--|
| Managing traditional and emerging business models  | "What our customers are asking for is not knowing what the network tells us about its performance but what our customers are asking for is what's the experience our end users get when they pick up their phone and start to surf Facebook or read their emails or watch some YouTube clips. What is the experience the end user gets when he does these activities. And all of a sudden the pure network performance KPI doesn't give you the full picture." |
| Having Goods-dominant logic and Service-dominant logic   | "But the issue is with the PSS...introducing such thing in PSS.... one of the key thing in PSS is that it requires a different thinking (Service-dominant logic), not only internally but also in terms of financing models, business models, relations etc. "   |
| Understanding 'value' based concept of product and 'functional benefit' based concept of product | "The daily talk of the solid mechanics group is not the business model. Even if there are smart people who realize this, We do not have business developers in the solid mechanics group. And on the contrary we do not have really any technical insights in the business development group...."  |

| Second Order Theme                              | Exemplary Quotations  |
|---|---|
| Integrated product-service development process  | "...The other is to verify and validate PSS solutions. You know how to do it for physical product. But for a product that contains conceptually different dimensions and services, you cannot put it into a testing machine"  |
| Possessing technical as well as business skills | "...The other one is that if you take the stereotype of the researcher in a research team...which is the guy or the girl in the research suit who is very nerdy and is looking into programs for technology. They need to know what kind of value it creates and be a bit more open in innovative thinking and thinking outside the box. Then they should be more open to start interacting with other complimentary skills in terms of business development" |

### EMPIRICAL FINDINGS

From the data a total of 12 first order categories were developed. These categories were grouped into 6 role conflict themes. These themes were further grouped into the three levels of overarching dimensions that we observed in the data. This structuring of the categories, themes, and dimensions is captured in Table 2.

**Table 2.** Data structure: Challenges in managing transition towards PSS as role conflicts

| First Order Categories                                   | Second Order Themes – Role Conflicts   | Third Order Dimensions                  |
|--|--|---|
| 1. Need to continue having market relevance              | Managing traditional and emerging business models (PSS)                                      | Organisational Level - Role conflicts   |
| 2. Organisation being competition driven                 |  |   |
| 3. Growth Opportunity                                    |  |   |
| 4. Transitioning from products towards service provision | Having Goods-dominant logic and Service-dominant logic                                       |   |
| 5. Change of business logic                              |  |   |
| 6. Using technology from a business perspective          | Understanding value based concept of product and functional benefit based concept of product | Unit level (R&D) - Role conflicts       |
| 7. Developing new evaluation parameters                  |  |   |
| 8. Established standardised product development process  | Integrated Product-Service development process   |   |
| 9. New or non-existent service development process       |  |   |
| 10. Exploration of new process for PSS development       |  |   |
| 11. Scarcity of people with Cross functional experience  | Possessing technical as well as business skills  | Intra-Unit level (R&D) – Role conflicts |

| First Order Categories                              | Second Order Themes – Role Conflicts | Third Order Dimensions |
|---|--------------------------------------|------------------------|
| 12. Traditional focus on recruitment of specialists |                                      |                        |

### Challenges in organisational change process and role conflict

We find that the challenges emerging out of PSS transition are in the form of role conflicts. These conflicts are essentially emerging out of the complex nature of the transformational change process that the organisation is experiencing due to PSS provision. Moreover these role tensions are seen to be not just at the individual employee levels in the organisation, but also at the unit level as well as the organisational levels. This is interesting to observe that, both the unit and the organisation as a whole experience role conflict like any member of the organisation. There is very little research to suggest the observance of such a phenomenon before however we do see this kind of ‘organisational role conflict’ that emerges in a change scenario within the organisation.

### Organisational level role conflict

#### *Managing traditional and emerging business models (PSS)*

The traditional business models of manufacturing companies are predominantly about selling physical product and service bundles to support the functioning of the products. This constitutes the major portion of the business for the manufacturing firms. However, with increased competition and ‘value based’ differentiation driving market offerings, the companies under competitive pressures are moving towards offering more and more PSS to maintain their relevance in the industry. The traditional business model built around offering physical products and supporting services is vastly different from offering PSS, which entails a completely different set of components in the business model. Both require very different focus and kinds of resources for the organisation.

*“We need to be able to put a monetary value to the to the service (PSS offerings) and we do not have the history to do it. For the yellow machines, we have really good business case model, product cost model, gross margin model to tell us that if we do this, then this will be our production costs, this will be the cost of the machine, this will be what the market will be willing to pay for it and we have to give the dealer certain margin and this will get this much revenue from it. But when we get into this enablers or services (PSS offerings) then we do not have those decision models (of traditional products) anymore and no decision support. And without those decision support models to be able to put the monetary value on the soft side of things to be successfully driving the right services and technology forward”*

With the fast pace of change in the market place, this transition is happening quicker than what most organisations have imagined. The traditional manufacturing organisations are therefore being compelled by the market forces to offer PSS and capitalize on the new growth opportunities it provides, at the same time, maintain their traditional business models which still contributes the major part of their revenues.

### *Having Goods-dominant logic and Service-dominant logic*

Organisations that have traditionally been offering manufacturing products have a Goods-dominant logic (GDL) to business (Vargo and Lusch, 2008). They have been involved in selling the product to the clients and supporting it with additional services that they sell. However in a PSS context, the focus shifts from the delivery of products to the delivery of the end benefit. This implies that, the means of the value delivery i.e. the product or the service is no longer relevant. The combination of what they delivery together is what matters to the end client. This is a Service-dominant logic (SDL) where the value is defined as the value-in-use in comparison to the value-in-exchange in a goods dominant logic (Vargo and Lusch, 2008). These are two different ways of doing business and organisations are faced with the challenge to manage them simultaneously.

*“We also have had to change the way we engage with customers. So we have come up with different types of engagement models. A hardware engagement model (GDL based) is completely different form a solution engagement model (SDL based). So we have come up with defining what those models are, adjust our processes and sales people. For example, we have business units called Radio and Cloud & IT. They face separate challenges. The radio business is very hardware oriented while cloud & IT are software oriented so we need to have different approaches on how to develop the products and a different approach in how we engage with customers”*

### **Unit level role conflict**

#### *Understanding value based concept of product and functional benefit based concept of product*

Traditional product development units in manufacturing firms are engineering oriented. The language of these units is about what the product (physical machine) can do or deliver or the ‘functional benefit’ of the product. In a PSS context, the shift happens from the product as the value delivery to what the product enables the end customer to do or a ‘value based product benefit’.

*“ Take one simple example. I am in a research organisation. A lot of technical junk is sitting down and (people are) thinking up of developing new technologies that hopefully someone can buy. The daily talk in the solid mechanics group (R&D unit) is not business or what value we deliver”*

These two conceptions of value are different from each other and the team members have are torn between the old functional benefit based thinking to the new value benefit based thinking.

#### *Integrated product-service development process*

PSS provision entails that the offer is in the form of an integrated product-service. This means that the physical products and services have to be integrated in a way that they together deliver the final offer. The final offer would involve selling the product as a benefit to the customers. The manufacturing firms usually have a well-established product development process and a newly developed service development process. Both the product and service development processes differ from each other significantly in terms of their concept, approach and nature. While the product development process is structured around an internal product-centric transactional view, Service development is usually a more relational and customer value driven view.

*“Everything is different (product development process vs. service development process). The product development process is very focused on developing new engines or a new cab. It is plastic and its*

*metal. It's things that we have done for hundreds of years. So the processes are tuned to that. The documents, everything back of that, the parts and parts number and so on. And service fits very poorly to this structure. In order to develop services (PSS offerings) we need new technology, need marketing for it and we need to prepare the organisation for it. And this part is not within the (established) development processes"*

However, when it comes to developing an integrated product-service (PSS offering), the firms have to combine or look for inspiration in the product and service development processes. This could be very conflicting proposition as going in the direction of one will lead away from the other. New product development units in these organisations are always dealing with this conflict in all the firms in this study.

### **Intra-Unit level role conflict**

#### *Possessing technical as well as business skills*

Within the R&D units, the requirement of skills and knowledge for PSS development is different from that of traditional technical manufacturing. A more value-based understanding of product is critical for success in the PSS provision. Personnel in R&D traditionally have very deep technical knowledge and skills. In addition to this a more broader business understanding is essential to be able to develop PSS.

*"The R&D guys here are tech guys. They do not understand how the specific technology that they are working on will become a business. But he is a damn good guy in technology. He understands what for eg. That radio transmitter does. We need people with both technical knowledge and business understanding and orientation. But finding such a person is so difficult. If I look at a technical guy, then I am sure I am missing out on business skill. And if I look for a business guy then he most probably does not understand technology like the ...technology guy. I don't know where I can find a guy with such broad skills. "*

An R&D unit therefore requires people with both deep-seated technical knowledge and broader business understanding to effectively develop PSS offerings. In organisations, specialists and generalists have very differing career paths. Most roles involve either a general or a special functional focus. Thus looking for one kind of personnel means moving away from people with the other. Finding such personnel is an often seen conflict for R&D units working towards developing PSS offers.

### **CONCLUSION**

Our initial focus of the study was on the challenges faced by an R&D unit in PSS transition. Through the research we stumbled upon a unique phenomenon of organisational challenges for the R&D unit in the form of role conflicts. PSS is an organisational transformation process and very little has been researched in context of R&D unit. We find that boundary spanning units like the R&D, are at the crossroads of the transition and are experiencing the effects of this transition strongly.

Limited studies have focused on specific aspects of the organisations and the challenges the functional units face in this transition process. They overlook the fact that to provide PSS the organisation needs also look at the way it is itself organised, and how it behaves in response as a whole and constituting parts. Also there is growing evidence that in a PSS context, role-conflict will

become increasingly relevant for manufacturing organisations to deal with to successfully move towards a service-dominant logic as in the case of provision of PSS (Edvardsson *et al.*, 2011). This is an aspect of PSS that is understudied and has very promising and interesting possibilities for researchers to contribute towards this literature.

#### *Theoretical contribution*

In our study we find empirical evidence of the emergence of role-conflict as a major challenge in PSS provision. This role-conflict is seen to be a result of the organisation not following the principle of unity of command and direction, which can be attributed as a result of the organisational transformation process. We also find that this role-conflict is not just experienced at an individual levels by the members, as has previously been studied in most researches in role-conflict, but can also be seen as organisational level phenomenon where both the R&D unit and the organisation as a whole seem to experience role-conflict. Therefore we see the emergence of the phenomenon of 'systems' level or 'organisational' role-conflict. This view of organisational role conflict in PSS context in our opinion has not been conceptualised before.

#### *Managerial Implications*

The managerial implication of our work could be at several levels. We believe our research firstly gives managers in large manufacturing companies a more holistic understanding of PSS transition in addition to the product and process challenges that they focus on. It will also give some guidance to help them to specifically look at role conflicts in their mix of decision variables for implementation of PSS. There are also specific examples of role conflicts in our research that managers could look for inspiration in their own context. We also hope that managers could get help to minimize or having better responses to role conflicts faced in the transition towards PSS and not respond with ambivalence which is certainly not desirable for successful achievement of set objectives.

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