When is Financing of Circular Business Models a Perceived Problem
A study of potentially correlated features

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Abstract

This study explores the challenge with obtaining financing for companies transitioning to PaaS models, and their related features. From our multiple case study we draw the conclusion that financing is an issue, and that it will require new strategies from both manufacturing firms and financiers to overcome.

Keywords

Circular economy, Business model, Product-as-a-service, PSS, Finance.

Introduction & Background

An economic system can be defined as a way of organising the production and distribution of goods and services, according to specific structures, rules and processes. This “operating system” of human societies moulds the way we interrelate with each other and the natural system. Since mankind belongs to and is dependent on the natural environment for satisfying its needs and surviving, it is vital to preserve and regenerate our natural ecosystems.
However, today’s current economic system relies on an indiscriminate use of resources and oblivious management of our “operating system” that have put our ecological environment under an unprecedented and dangerous pressure. This situation, as argued by many authors from different scientific fields (Stahel 2010, EMF 2012, Tukker 2015, Bocken et al. 2018), coupled with other macro-trends such as an increasing global population, is not sustainable and requires a new “operating system” to ensure sustainable development and the mankind survival.

Over the past few years, the concept of circular economy (CE) has gained increasing attention as a means to pursue sustainable development. A CE is essentially an economy with greatly reduced material throughput, driven by renewable energy which demands a great transformation and a tremendous structural change.

In other words, there is a need to decouple economic wealth creation from the consumption of finite resources. Such a shift requires the adoption of a radically new value creation and distribution logic which should be translated in innovative business models where products, components, services, materials, and their by-products circulate at their highest value for the longest period (Hopkinson et al. 2018). However, research shows that the obstacles to such a transition are manifold and include the following, as shown in table 1:

Table 1. Obstacles to transition to PaaS models.

<table>
<thead>
<tr>
<th>Category</th>
<th>Obstacles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial</td>
<td>Measuring financial benefits of circular economy; Financial profitability</td>
</tr>
<tr>
<td>Structural</td>
<td>Missing exchange of information; Unclear responsibility distribution; Lack of Political support</td>
</tr>
<tr>
<td>Operational</td>
<td>Infrastructure / Supply chain management; Develop appropriate market signals</td>
</tr>
<tr>
<td>Attitudinal</td>
<td>Perception of sustainability; Risk aversion</td>
</tr>
<tr>
<td>Technological</td>
<td>Product design; Integration into production processes</td>
</tr>
</tbody>
</table>
Different rationale and tools are therefore imperative, and in this paper we will focus on - out of several resource allocation strategies - the financial mechanisms that could hinder a transition to a CE. When a company moves to a PaaS model, the ownership of the product is retained in the company. This is one of the strongest incentives for circularity and resource efficiency, as the driving force of the company changes from a flow-oriented (sell as many products as quickly as possible) to a value-saving (keep the product as long as possible) business logic (Stahel 2010).

Our assumption is that this change in ownership may have major consequences for the manufacturing company's balance sheet. Instead of the products disappearing from the balance sheet when sold, they will remain as an asset throughout the period the company uses them for their rental/service activities. Hopefully - from a circular perspective - for many years. This means that the company's cash flow will change which, in turn, will impact the need for capital and external financing. Earlier studies show that financial market players do not value long-term stable revenue and cash flows sufficiently high, but work with risk and credit assessment, where the more short-term impact on cash flow and balance sheet, as well as difficulties in establishing a correct residual value for used products, become a problem (Linder and Willander 2015, FinanCE 2016, EIB 2015, Circle Economy 2016). However, the literature on to what extent and under what circumstances this is a real problem for the transition remains scarce.

The degree of complexity is amplified at a business ecosystem level. Today's economy is characterised by a high level of interdependence and interconnectedness that is boosted by an exponential development of technology. Products and services are embedded in wider and more complex systems than ever before (Roome and Looche 2016). Therefore, any business activity including financing, is heavily dependent on and affected by the organisation’s network and external environment (Bocken et al. 2018, Roome and Louche 2016). It follows that business success, particularly in terms of successful transition towards a CE system, largely derives from how rapidly and effectively organisations evolve. Increasing attention needs to be given to the relationship between social, economic and financial systems, economic opportunities, technology, know-how and social and environmental conditions (ING 2015, Roome and Looche 2016).
This research investigated the potential challenges in obtaining the necessary capital for companies who want to transition from selling goods to selling function or service. The study has been conducted in Sweden encompassing both manufacturing firms and financial actors. However, the current analysis mainly considers the work and results from data collection with the manufacturing and production companies. This will ensure a clear focus of the analysis while providing sufficient information on the discussed topic. A separate paper further evaluating data and information elaborated from the interaction with financial stakeholders could be developed, as a next step.

The following research questions have been answered:

- Is availability of capital a real challenge for firms who want to transition to PaaS models?
- If so, what seems to be the likely features of the companies who experience the problem?

Method

This study benefitted from a variety of sources which have supported wide-ranging and complex research questions whilst strengthening sources reliability (Yin 2009). A mixed-data approach seems to be particularly valuable when applied to social sciences since these intrinsically deal with complexity and contradictions (Bryman and Bell 2011).

According to complexity theory the adoption of a case study approach is an instrumental and guiding tool to investigate a phenomenon as an integrated whole (Anderson et al. 2005). Moreover, case studies are likely to greatly contribute to knowledge creation in relatively unexplored research fields (Yin 2009) such as finance in the CE. Consequently, the study of cases presents a portrait of some companies and their potential to embrace circularity through the elaboration of several sources and tools that can be applied in similar contexts.

In this multiple case study a range of data have been adopted including the use of qualitative and quantitative data from secondary and primary sources. The collected secondary sources comprise documentation from publicly available documents such as market reports, analyses, third-party articles from websites and publicly available financial reports. The primary sources were collected during
individual interviews in person and over the telephone; exchange of emails and workshops with two types of key players, i.e. manufacturing firms and financial actors.

**Set of companies:**

The cases in our study consists of ten different manufacturing and selling companies. They represent a wide spread of businesses of different sizes, in diverse industries, owned by various types of actors and with diverse levels of circularity status. They are all companies that either already use PaaS models and/or want to expand into these models, see table 2 for a brief overview, based on interviews and publicly available financial data:

*Table 2. Brief overview of investigated companies*

<table>
<thead>
<tr>
<th>Company</th>
<th>Short description of value proposition and circular ambitions</th>
<th>Turnover (MSEK)</th>
<th>No of employees</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>A designs, manufactures and sells office furniture. A has a classic linear business model and a clear sustainability profile with high circular ambitions. A is at the beginning of the development towards PaaS models, and have so far conducted a few test sales.</td>
<td>4137</td>
<td>2279</td>
</tr>
<tr>
<td>B</td>
<td>B designs and sells functional clothing for an active life and works exclusively with different types of circular models (e.g. recycled materials in garments and garments that can be recycled). PaaS models are still a relatively small part of sales, though increasing.</td>
<td>137</td>
<td>42</td>
</tr>
<tr>
<td>C</td>
<td>C manufactures and sells interior fittings for service vans. C looks for new business models mainly through the addition of digital services, and sees the transition to PaaS models as a long-term project, which has not yet started in practice.</td>
<td>231</td>
<td>89</td>
</tr>
<tr>
<td>D</td>
<td>D designs, manufactures and sells small light electric vehicles for taxi use. D is in the start-up phase and looks for expansion paths, both through product sales and PaaS models.</td>
<td>5</td>
<td>9</td>
</tr>
<tr>
<td>E</td>
<td>E rents out forklifts to companies in different industries, both short and long term. The offer includes services/uptime agreement. Each forklift is rented several times and sold on a secondary market at the end of the rental period.</td>
<td>1523</td>
<td>437</td>
</tr>
<tr>
<td>F</td>
<td>F designs and manufactures lighting and fittings from used components and leases them to</td>
<td>1</td>
<td>4</td>
</tr>
</tbody>
</table>
property owners. F is in the start-up phase and sets out to drive a sustainable and circular business.

G
G buys, rents and leases out coffee and vending machines to a broad business market. Since the start, G has used a model where machines are rented or leased out for at least two rounds, usually to the same customer. The offer includes coffee, service and repair.

H
H is a global giant in electricity transmission, infrastructure, industry and transportation. The product line ranges from electric motors, transformers and robots to switches and pushbuttons. Most of the products are long-lived (40+ years) and it has been difficult to accelerate circular development mainly due to customer resistance.

I
I rents out entrance mats to companies and public organisations. This circular business model has been in place since the start of the company, with almost all of the turnover being generated from the PaaS business.

J
J buys and sells used furniture. The furniture are reconditioned and, if necessary, repaired and sold with warranty. About 30% of the turnover is PaaS based, and the company’s goal is to continuously expand that part.

<table>
<thead>
<tr>
<th>Definitions of features and criteria used for classification:</th>
</tr>
</thead>
<tbody>
<tr>
<td>From the interviews and from publicly available financial reporting, we have gathered some descriptive statistics about these case companies, which allows us to compare them and draw some conclusions in relation to our research questions. The data are not statistically proved, yet they provide us with some valuable insights about situations when financing of a transition to PaaS cannot be expected to be solved with a business as usual approach, but will need some extra attention.</td>
</tr>
</tbody>
</table>

The criteria we have chosen to look at, the data source and the different possible outcomes for each of them, are summarised in table 3:

Table 3. Criteria for analysis.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Data source</th>
<th>Different possible outcomes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circular expansion plans</td>
<td>Interviews</td>
<td>• Y – Yes, the company plans to expand the PaaS business</td>
</tr>
<tr>
<td>Category</td>
<td>Method</td>
<td>Description</td>
</tr>
<tr>
<td>----------------------------------------</td>
<td>-------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
</tbody>
</table>
| Is availability of capital in relation to the transition, a problem or not? | Interviews  | • Y – Yes, the company has already encountered issues with obtaining financing  
• Y → N – The company expects to encounter issues when starting/continuing expansion  
• N – No, the company has not encountered and does not expect to encounter issues with financing |
| Circularity level (in terms of PaaS)   | Interviews  | • L – No, or very small, existing PaaS business  
• M – Less than 50% of turnover is PaaS based  
• H – More than 50% of turnover is PaaS based |
| Ownership                              | Interviews  | • Family  
• Founders  
• Small engaged group  
• Investment company  
• Private equity fund  
• Listed on stock exchange  
(or combinations of the above)         |
| Business maturity                      | Financial statement | • Start-up – Less than 10 years on the market  
• Established – More than 10 years on the market |
| Financial stability (EBIDTA/turnover – average over 3 years) | Financial statement | • Not stable – Below 0%  
• Stable but low – Less than 5%  
• Stable – More than 5% |
| Size                                   | Financial statement | • SME – Less than 500 MSEK turnover, and less than 250 employees  
• Large – More than 500 MSEK turnover, and more than 250 employees |
Findings

The first research question - if the availability of capital is actually a challenge for the companies who want to expand their PaaS operations - are summarised below in table 4:

*Table 4. Is availability of capital a challenge or not?*

<table>
<thead>
<tr>
<th>Company</th>
<th>Circular expansion plans</th>
<th>Financing is an issue</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Y</td>
<td>N → Y</td>
</tr>
<tr>
<td>B</td>
<td>Y</td>
<td>N → Y</td>
</tr>
<tr>
<td>J</td>
<td>Y</td>
<td>N → Y</td>
</tr>
<tr>
<td>I</td>
<td>Y</td>
<td>N → Y</td>
</tr>
<tr>
<td>D</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>F</td>
<td>Y</td>
<td>Y</td>
</tr>
<tr>
<td>C</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>E</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>H</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>G</td>
<td>Y</td>
<td>N</td>
</tr>
</tbody>
</table>

From this, we can draw the following conclusions on if financing is a real issue for expansion of PaaS models or not:

➔ Yes. Many companies that have expansion plans for their PaaS business have already experienced or assess that they will experience, difficulty with financing.
To analyse the second research question about what typical features seem to be correlated with the fact that the company has an issue with financing or not, we combine the other selected criteria with the issue level, as depicted in table 5:

**Table 5. Correlation between the challenge and selected features.**

<table>
<thead>
<tr>
<th>Company</th>
<th>Financing is an issue</th>
<th>Circularity level</th>
<th>Ownership structure</th>
<th>Business mat</th>
<th>Fin. stability</th>
<th>Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>N → Y</td>
<td>L</td>
<td>Family</td>
<td>Est</td>
<td>Stable but low</td>
<td>L</td>
</tr>
<tr>
<td>B</td>
<td>N → Y</td>
<td>L</td>
<td>Founders + small group</td>
<td>Est</td>
<td>Stable but low</td>
<td>SME</td>
</tr>
<tr>
<td>J</td>
<td>N → Y</td>
<td>M</td>
<td>Founders/family</td>
<td>Est</td>
<td>Stable</td>
<td>SME</td>
</tr>
<tr>
<td>I</td>
<td>N → Y</td>
<td>H</td>
<td>Founders/family</td>
<td>Est</td>
<td>Stable</td>
<td>SME</td>
</tr>
<tr>
<td>D</td>
<td>Y</td>
<td>L</td>
<td>Founder + small group + listed</td>
<td>Start-up</td>
<td>Not stable</td>
<td>SME</td>
</tr>
<tr>
<td>F</td>
<td>Y</td>
<td>H</td>
<td>Founders/family</td>
<td>Start-up</td>
<td>Not stable</td>
<td>SME</td>
</tr>
<tr>
<td>C</td>
<td>N</td>
<td>L</td>
<td>Investment comp</td>
<td>Est</td>
<td>Stable</td>
<td>SME</td>
</tr>
<tr>
<td>E</td>
<td>N</td>
<td>H</td>
<td>Large group/listed</td>
<td>Est</td>
<td>Stable but low</td>
<td>L</td>
</tr>
<tr>
<td>H</td>
<td>N</td>
<td>L</td>
<td>Large group/listed</td>
<td>Est</td>
<td>Stable</td>
<td>L</td>
</tr>
<tr>
<td>G</td>
<td>N</td>
<td>H</td>
<td>Private equity</td>
<td>Est</td>
<td>Stable</td>
<td>L</td>
</tr>
</tbody>
</table>

From this, we can draw the following conclusions on how these features seem to correlate with the experienced level of issue with obtaining finances, for our companies.

**Circularity level:**
Companies with high, low and medium circularity levels (i.e. the current part of the turnover related to PaaS sales) are represented in both the group that is experiencing financing issues and the group that is not. Hence, the circularity level as such does not seem to be correlated with the issue of financing.

**Ownership structure:**

All companies experiencing an issue, or assessing that they will have an issue when they expand the PaaS models, are owned by family, founders and/or a small engaged group of owners. One of them is also listed on a stock exchange. The companies that do not have an issue with financing are either part of a larger group or have financially strong owners, such as investment companies. Hence, there seems to be a correlation between issues with financing and ownership structure.

**Business maturity:**

Start-ups in general have issues with financing and this is also the case here. However, also the established firms have difficulty with financing. Hence, the fact that the company is established does not guarantee exempt from issues with financing.

**Financial stability:**

All companies that are financially unstable (i.e. the start-up companies) have issues with financing. However, some of the companies with a stable financial situation have the same problem. Hence, financial stability of the company does not guarantee exempt from issues with financing.

**Size:**

All SME’s experience issues with financing. All large companies, except one, are assessed not to have issues with financing. The large company that does have an issue with financing is the only one of the established companies that also faces a stable but low profitability. Hence, there seems to be a correlation between issues with financing and size, at least partly. SME’s in general seem to face the problem more often than large companies, but large companies are not exempt from issues with financing.
It is not possible to draw any statistical conclusions from these facts, but the combined insights from these descriptive statistics suggest the following tentative correlations between different company features and the issue with financing:

➔ Even if the company is financially strong and has a mature business, it does not guarantee that the PaaS expansion can take place without special consideration of financing. SME’s are more likely to encounter issues than larger companies. Companies owned by family, founders or small engaged owner groups are also more likely to encounter issues than companies that are part of larger groups.

Discussion

The results of our study can be used to better understand what type of companies can expect to meet challenges when transitioning to PaaS models. These insights can, in turn, be useful for developing strategies to meet the challenge - both for the manufacturing firms themselves and for the financial actors.

Normally, stable and profitable companies can test PaaS business models on a small scale without external financing. As soon as a PaaS model is to be scaled up, however, unanimity is high among our interviewed companies, that an external financier is required. At some point of the PaaS based income share of total sales (and which may vary for different companies depending on the financial position), short-term liquidity will need to be strengthened. This confirms the "liquidity gap" theory in the literature (ING 2015). The stronger the balance sheet is, the longer a company can manage without external borrowing.

Companies that are subsidiaries in larger groups and/or have strong owners can normally obtain working capital financing within the group, either from a mother company or from a dedicated finance company within the group. As long as the group is stable, financing is not a concern for the individual subsidiary. However, the cost of internal financing compared with costs of external loans has not been considered here. This is potentially worth studying further, since internal financing is more costly than external financing.
Small start-up companies are normally in search of capital for general expansion of the business, and problems in obtaining financing are not limited to the expansion of PaaS models.

Overall, the issue with financing is a real challenge for most companies transitioning to and expanding PaaS models. To succeed in this endeavour - and thereby contribute to the overall transition to a CE and the awaited environmental gains - it is strongly suggested that companies work strategically with this issue. Strategic work could involve purely internal activities, such as adjusting KPIs to cope with the new balance sheet situation and, in the more developed case, treat the new PaaS business as a “special purpose vehicle” (Govindarajan and Trimble 2010) to allow for different business models with different KPIs to be run in parallel. However, based on some of the data collected from the financial actors of our study, when creating a strategy for expansion of PaaS models the following aspects involving the external financier are particularly important to address:

- A profitable business case is central to all assessments of creditworthiness and refunding capacity. Specific challenges in relation to the PaaS business case includes the fact that the PaaS model might be new in the industry, which means that the financier does not have adequate benchmark data, to assess the business case. In addition, the time perspective of the assessment changes, with the relatively longer payback time for each product produced. The financier needs to update risk assessment, both in terms of time perspective and in terms of business case benchmarks.

- Collateral needs special attention. In the PaaS cases, “normal” collateral, such as valuable fixed assets or a fast churning inventory, might not be available. In fact, in a PaaS model aiming for high circularity, the goal is to have an inventory with products which churn as slowly as possible. This is challenging from a traditional financing perspective. The notion of collateral will have to be rethought, possibly including contracts and customer relations. The realisation of this type of collateral - at the event of bankruptcy - is also challenging in an industry with emerging PaaS models, due to unestablished secondary markets.

As suggested in the literature (Bocken et al. 2018, Roome and Louche 2016), there is a need for expanding networks and business ecosystems in relation to
expansion of PaaS models. Our findings suggest that the companies aiming for PaaS need to establish a close relation with their financiers. There is a need for a deep understanding of the customer’s business from the financier’s side, potentially also including understanding of the customer’s customers. The financier thus becomes an important part of the new business ecosystem around the emerging PaaS business.

It remains to be seen whether a lack of financing will actually hinder the shift to circular business models, or only postpone it, until the challenges are solved. The purpose of this paper is to augment the knowledge of the challenges, so as to increase the probability to overcome them.

Conclusion

On the backdrop of the global environmental challenges of our time, a CE promises to provide an important piece of the solution puzzle. Circular business models in general, and PaaS models in particular, are important and powerful enablers of the transition, since they engage industry and business with their huge potential to scale up new production and consumption patterns.

We set out to investigate one of the least explored challenges of the transition to PaaS for manufacturing firms, namely the need for financing. In a multiple case study, based on data collected in interviews and workshops together with a number of manufacturing firms and financial actors, we conclude that financing is an issue for most manufacturing firms, regardless of previous experience with PaaS models, financial stability, size and business maturity. Manufacturing firms owned by large corporations and strong owner groups, such as investment companies, seem to be the exception, and might not be as strongly reliant on external capital for the expansion. Our research also suggests that the financial actors who wish to be part of this emerging business, need to revise their view on collateral and set out to truly understand the business of their customers. The financiers have an important role to play in the new business ecosystems around the emerging PaaS business.

With this study, we have made an empirical contribution to the field of CE and finance. Our conclusions are preliminary and we strongly recommend that more research is undertaken in the area of both financing strategy and the financiers’ role in emerging circular business ecosystems.
References


