Emerald Insight

For Authors

If you would like to write for this, or any other Emerald publication, then please use our Emerald for Authors service information about how to choose which publication to write for and submission guidelines are available for all. Please visit www.emeraldinsight.com/authors for more information.

About Emerald www.emeraldinsight.com

Emerald is a global publisher linking research and practice to the benefit of society. The company manages a portfolio of more than 290 journals and over 2,350 books and book series volumes, as well as providing an extensive range of online products and additional customer resources and services.

Emerald is both COUNTER 4 and TRANSFER compliant. The organization is a partner of the Committee on Publication Ethics (COPE) and also works with Portico and the LOCKSS initiative for digital archive preservation.

Portfolios of control in mobile eco-systems: evolution and validation

Sandip Mukhopadhyay, Harry Bouwman and Mahadeo Jaiswal

Sandip Mukhopadhyay is based at MDI (Management Development Institute), Gurgaon, India and IBM India Private Limited, India. Harry Bouwman is a Professor based at ICT-TBM, Delft University of Technology, Delft, The Netherlands, and IAMSR, Åbo Akademi University, Turku, Finland. Mahadeo Jaiswal is based at MDI (Management Development Institute), Gurgaon, India.

Abstract

Purpose – *This paper aims to study the critical role played by interorganizational control mechanisms in a mobile ecosystems and how the portfolios of control evolves when the service moves from an initial idea to a solution that reaches market acceptance. Existing literature provides limited insight into (portfolios of) control mechanisms and how (portfolios of) control dynamically evolve(s) during the various stages of service innovation.*

Design/methodology/approach – *Based on the Resource Dependency Theory (RDT), this study makes use of multiple cases to identify and validate the key roles of behavioural input and output control mechanisms and how they evolve during different phases of service development.*

Findings – *Based on multiple cases, it is concluded that a dominant actor uses portfolios of control to acquire complimentary resources, coordinate interdependence between multiple partners and ensure a favourable value distribution for itself. Behavioural control is used in a limited way during the implementation and commercialisation phases, while input control is mostly used during the development phase and output controls are mostly used during implementation and commercialisation phases. The high occurrence of input control in the development phase ensures the lower occurrence of behavioural controls in the implementation phase. This study is very practical in nature, and it provides important insight on how to develop mobile services in collaboration with other organisations.*

Research limitations/implications – *A limitation of this study is that it is based on two cases in a specific regulatory, cultural and institutional environment, i.e. India, which means that further testing of the propositions, with large-scale samples and within a more international setting, would be required. However, this study does provide some interesting insights that have to be corroborated by additional case studies and a large-scale questionnaire, initially with a focus on India.*

Originality/value – *From an academic perspective, this study examines organisational controls in a less researched yet dynamic services industry, and is one of the first studies that the researchers have come across that uses RDT to explain the dynamics of control in value networks in the mobile industry. This study is also one of the very few to focus on understanding the objectives of the portfolios of control from the perspective of the structural player. As mentioned earlier, research focussing on integrating governance mechanisms and portfolios of control may provide new insights. From a practical perspective, this study may shed light on how to develop mobile services in collaboration with other organisations.*

Keywords India, Mobile communications systems, Case studies, Strategic alliances, Content management, Service delivery systems

Paper type Research paper

Introduction

With the advance of feature-rich mobile phones and mobile network technology, mobile communication has spread and diffused into our daily lives (Nikou and Mezei, 2012). There is also a realisation among business managers that the future growth of revenues in the mobile communication industry will be driven by innovative mobile value-added services (VAS), rather than by subscriber growth alone (Carlsson *et al.*, 2006; Gerpott, 2011). Other than individuals, enterprises from different industries (Banking, Insurance, Healthcare, Telecom, Retail and Government) are transforming their businesses towards mobile to

achieve their business objectives, like differentiation and personalisation of customer experience, to extend their business to mobile customers and workforce and to improve operational efficiency, as well as customer intimacy.

While the importance of mobile services is well understood, mobile service innovation is a complex activity that requires a broad set of diversified resources and capabilities (De Reuver, 2011; Peppard and Rylander, 2006). Examples of these resources are network resources, payment mechanisms, device handling, content copyright and know-how regarding customer behaviour. Due to their varied nature, no individual player can (or aspires to) acquire and control all the resources and capabilities involved. A viable and sustainable business model for mobile value-added services requires multiple organisations to work together by sharing their resources and capabilities and creating value together in the process (Bouwman *et al.*, 2008; Peppard and Rylander, 2006).

Collaborative value creation among partners with diverse backgrounds comes with many challenges and barriers. "Actors may originate from different industries (e.g. network operators, financial institutions, and retailers) each with their own peculiar business logic" (Faber *et al.*, 2003, p. 3). No individual partner has formal authority over other partners, strategic objectives may vary and change over time, which means that partners may lose interest in the collaboration, which, in turn, may induce them to block important decisions and renegotiate the terms of the collaboration.

Effective governance and control mechanisms are seen as a possible avenue to overcome the problems outlined above (De Reuver, 2011). That is why business model design for mobile value-added services involves the optimal configuration of control and value parameters (Ballon, 2007, 2009). Confirming this, Tiwana *et al.* (2010) argue that it is important to enforce appropriate levels of control and provide autonomy to Complementary partners for innovation. Although, there is significant interest in understanding the role of control in ecosystems that develop and provide mobile services, research into governance, and specifically into control mechanisms focussing on mobile service development, is scarce. Existing research on control focusses on retail salespeople (Eisenhardt, 1985), marketing executives (Jaworski and MacInnis, 1989) and internal information systems (IS) projects (Beath, 1987; Kirsch, 1996, 1997; Kirsch *et al.*, 2002), as well as on outsourced software development projects (Choudhury and Sabherwal, 2003). Existing literature also confirms that governance mechanisms are not static in nature, but that they co-evolve with the life cycle of the service in question (De Reuver and Bouwman, 2012). The changing and evolving nature of control portfolios, defined as the mix of control mechanisms being used, has also been confirmed in system development and information technology (IT) Outsourcing research (Kirsch, 1997). Choudhury and Sabherwal (2003) found that the portfolio of control changes over the life time of information systems (IS) projects. The conclusion is that, although existing literature provides indications regarding the evolving nature of control, how control mechanisms change over time and why, is less clear. More specifically, studies into the dynamics of control mechanisms and the role they play in the mobile services industry are, to our knowledge, limited. If we limit ourselves to similar researches within the Indian context, it does not exist. Consequently, this study addresses three research questions:

RQ1. What are the key control mechanisms available to dominant players in a mobile ecosystems?

RQ2. How does the portfolio of control mechanisms change over time when a mobile value-added service develops from an initial idea to a solution that reaches market acceptance?

RQ3. What objectives are achieved by dominant players or ecosystems leaders through the use of control mechanisms?

The remaining part of this paper is structured as follows. First, relevant literature and research is analyzed. Next, we discuss our qualitative and exploratory research approach,

followed by the results of our iterative case studies. Based on these two cases, we formulate and validate propositions. Finally, we discuss the main outcomes, limitations and future research opportunities.

Literature

Scholars have found that the value chain model is inappropriate for the analysis of mediation services (such as telecommunication, transportation and banking) and problem-solving services (such as consulting, health care, law and architecture) (Stabell and Fjeldstad, 1998). In the case of mobile services, a number of multiple independent organisations work together, in a value net (Li and Whalley, 2002; Peppard and Rylander, 2006) or in an eco-system (Moore, 1993), to develop and deliver services to end-users. The process of developing and delivering services follow certain phases. Existing literature provides a number of different phasing models for service innovation (Tidd *et al.*, 2001; Alam and Perry, 2002; Johnson *et al.*, 2000). Although these models all differ in numbering and labelling the phases involved, there is some commonality. Specific to mobile services, Bouwman *et al.* (2008) have come with three main phases of service design:

1. development of service concepts;

2. experimentation and implementation in a limited market setting; and

3. commercialisation.

This is the model we have used in terms of the operational definition of the different phases.

We view control through the prism of Resource Dependency Theory, popularly known as RDT (Pfeffer and Salancik, 2003), which explains that the key to organisational survival is the ability to acquire, control and maintain resources and capabilities. No organisation can own all the resources and capabilities needed for its business, but it can have access to resources provided by other firms. This particular process creates interdependence between firms. Because of their interdependence, organisations with access to critical and rare resources are in a position to exert control over dependent organisations. However, at the same time, dependent organisations use a number of control mechanisms to reduce the dependency and uncertainty involved in acquiring external resources.

The dominant model of organisational control was developed by Ouchi (1977, 1979, 1980) and later expanded by other researchers (Eisenhardt, 1985; Snell, 1992; Govindarajan and Fisher, 1990). In this study, controls are defined as the mechanisms used by dominant or lead partners within an ecosystem to create conditions that motivate and influence the other organisations to achieve the desired outcomes and, in the process, reduce the risks, uncertainties and costs involved in procuring resources for dominant organisations. As we have discussed, dominant actors in an ecosystems can manage this due to the power that comes from owning and controlling critical resources.

According to organisational literature, there are three types of formal control: behavioural, input and outcome control (Ouchi, 1979; Eisenhardt, 1985; Snell, 1992; Kirsch, 1996, 1997; Kirsch *et al.*, 2002; Johnson, 2011). When a desirable behaviour necessary for a task is identified and can be observed, behavioural controls are recommended (Govindarajan and Fisher, 1990). Behavioural control is mostly implemented through explicitly specifying the appropriate behaviour (e.g. development methodology, internal testing guideline) that can be observed and evaluated by the dominant partner (Kirsch, 1997). Behavioural controls need more supervision, effort and time, as well as a better understanding of the underlying processes. Sometimes, behaviour controls are assumed to have a negative impact on creativity and innovation (Adler and Borys, 1996). In an outcome-control scenario, the focus is limited exclusively in understanding, evaluating and monitoring the results. Network partners are free to decide how they will achieve the desired outcome. Although outcome control focusses mostly on outcome-based incentives, there may be elements of punishment for failure to achieve the goals (Merchant, 1985). One of the drawbacks of

outcome control mechanism is that, often, the controller focusses on outcomes that are easy to measure instead of on more complex outcomes and that are harder to measure, but more in line with the desired goals (Kerr, 1975, Merchant, 1985). The third type of control, i.e. input control, is used to acquire specific skills and experiences. Partners are selected and admitted to the ecosystem by the dominant players because they can provide the desired resources (Snell, 1992; Cardinal, 2001).

Initially, Ouchi (1979), starting from a contingency view, suggested that a specific mode of control could be related to a specific context, and a specific type of control mechanism was related to a specific situation. However, research showed that a focus on multiple control modes, i.e. using a mix of control mechanisms within a portfolio, was more effective and did lead to desired objectives (Jaworski *et al.*, 1993; Harmancioglu, 2009). As a result, instead of a single control, it is proposed that a portfolio of different combinations of control mechanisms should be used (Kim, 1984; Kirsch, 1997). Based on two exploratory cases, we analyse which control mechanisms, i.e. behavioural, outcomes or input control, will be used by dominant actors in an ecosystem. We have also identified the key motivations for using control in mobile service innovation processes. Next, we discuss our case study approach in greater detail.

Research method

We have used a multiple case study approach to explore the phenomenon of control mechanisms in a mobile service innovation context. Case studies are a preferred method for social science research to answer how and why questions and when dealing with a contemporary phenomenon in a real-life context (Yin, 2009). The two cases are based on an iterative replication logic, designed to shed light on the phenomena under study, following a social constructivist perspective. Our main focus is on understanding how actors make use of control mechanisms to achieve certain objectives. Based on the first case study, initial propositions are formulated. The second replicative case validates, as well as deepens, the insight derived from the first case. Using multiple, iterative case studies allows us to build a more robust, generalisable and parsimonious theory (Eisenhardt and Graebner, 2007).

We developed protocols for the case studies themselves as well for interviews to be executed per case. In the interview protocol (attached in Appendix A), questions focus on the service being offered, the enabling technology, the ecosystem and the position of the dominant actor within the ecosystem, as well as on the control mechanisms and objectives for using different control mechanisms. We used a qualitative software tool (Atlas.TI) for coding and data analysis. The use of a software tool provides a more systematic way of studying relationships among data and helps avoid biases in data analyses (Barry, 1998; Markus, 1989; Miles and Huberman, 1994; Pettigrew, 1985).

The two mobile cases on mobile service innovation under study meet the following selection criteria. First, the service is delivered over a mobile or wireless network. Second, the service is delivered by a ecosystems with more than three actors. Third, this service is commercially launched and has gone through all the three phases of service development.

In addition to public information, we used semi-structured interview as a primary source for data collection. The respondents selected for the interviews are directly involved in conceptualisation, strategic direction or day-to-day operation of the services. Interviewees were further asked to identify or recommend any other important stakeholders within the ecosystem. In the first case, involving a mobile advertisement service, six interviews with four interviewees were executed. For the second case, Caller Ring Back Tune, interviews with six informants were held (Table I). Although the interview protocol was used for conducting these interviews, the interviewees are allowed to divert and add any topic that they felt was important.

Table I	Interviews and interviewees for the two cases	
	Role	*No. of interviews*
Organization Case 1		
Operator	IT Product Manager	2
Operator	Product Manager	1
Application Provider	Project Manager	2
Content Aggregator	Operation Lead	1
Organization Case 2		
Operator	Product Manager 1	1
Operator	Product Manager 2	1
Platform Provider (1)	Relationship Manager	1
Platform Provider (2)	Technical Manager	1
Content Provider (1)	Account Manager 1	1
Content Provider (2)	Account Manager 2	1

We started data analysis after reaching a level of saturation when new interviews did not contribute new insights. Atlas.Ti is used for coding key concepts, memos are used to document understanding and interpretation during the analysis phase. Memos were later used to develop the argument for our analysis. The cases were analysed following a two-stages approach, a more descriptive phase and a more analytical phase.

In the initial phase, we first described the service, i.e. the ecosystem and relevant aspects of the constituting business model, such as the value proposition, actors and roles involved. After that, we identified and coded three key constructs critical to our study: different phases of service innovation, control mechanisms related to three types of control types and resources used in service development. While identifying and coding the resources required in different phases, we also divided them into two categories, essential and complementary. In line with the RDT, a resource is considered essential when that resource cannot be acquired from any alternate provider and is crucial to the development and implementation of the service.

To identify the control mechanism related to different types of control, transcripts of interviews were read multiple times and relevant parts were coded. The guidelines for associating identified control mechanisms and three types of control were adapted from the work of Choudhury and Sabherwal (2003) and Snell (1992).

To identify behavioural control, we looked for the following kinds of mechanisms:

- Mechanisms by which the lead organisation explicitly specified rules, procedures or processes and guidelines for the partners to follow within their organisation.

- Mechanisms related to the direct monitoring of the partners' behaviour. Any mention of information systems designed to help the lead partner to monitor partner behaviour.

Similarly, the use of outcome controls is established based on the following mechanisms:

- Mechanisms to explicitly specify desired outcomes (can be related to product feature, new revenue target, customer satisfaction, time line and others) but without specifying in details how the outcome should be realised.

- Mechanisms to assess the quality, schedule adherence and business impact of outcomes delivered by the partners.

The use of input control is identified by the following mechanisms:

- Mechanisms to identify and attract the right type of partners in the ecosystems.

- Mechanisms to evaluate and select ecosystems partners for the service.

- Mechanisms to provide necessary information and allow access to the relevant IT and Network systems for the identified partners.

- Mechanisms that demonstrates the importance or pride of hiring the best partners.

The second stage was more analytical. Here, we developed and validated key propositions to show relations and causalities between key constructs. To justify and illustrate the finding, we provided a selection of quotes in our report.

Results

The mobile advertisement case

The first case involves a mobile advertisement service (popularly known as mAD) launched in India by one of the Tier-2 or mid-sized Indian telecom operators, in October 2012. The subscribers of the operator can earn free local call credit by watching video advertisements before making any local or national call. To use the service, the user has to download the application or dialer. After installing the application on the device, whenever the user makes an outgoing call, a pop-up will offer him a choice of a "Free Call" or a "Paid Call". If the user chooses "Free Call", the application plays a short video advertisement, after which the outgoing call is connected seamlessly. Once the call is completed, recharge and billing systems of the operator credits a predetermined amount to the user account.

The service being provided to the subscriber is free. Users are not charged for activation of the service, application download or viewing of the video content. At the time of data collection, the service was available only for Android-based phones and low-end Brew handsets. The number of free advertisements a user is allowed to view, depends on the advertisement inventory available with the operator, at the time of the initiation of the call.

Ecosystem. The ecosystems (Figure 2) shows the different actors, roles and value exchanged between the actors involved. Value exchange involves the transfer of money, information and other tangible and intangible assets. The operator is the dominant player in the ecosystems. The other key partners in the ecosystems are the application provider, advertisement content aggregator and advertisers (i.e. Nike, Coke and others). The application provider is also responsible for the technical operation and enhancement of the applications. The advertisement content aggregator or the agency brings in new advertisers for the service and also executes the campaigns for the advertisers (Figure 1).

*Business model.* Here, we present the core elements of the mAd business model.

Value propositions. The customers are credited free call based on the number of video contents they have viewed. The service enable telecom operators to monetise their subscriber base and create an additional revenue stream in a challenging market like India; known for very low average revenue per user. Advertisement providers are able to target specific audiences with their campaigns. In India, in terms of customer reach, mobile phones have exceeded most other types of media. Mobile service providers have profile information about their users, which means that the mobile advertisement service allows advertisers to reach a large audience as well as target an audience in a more selective and personalised way.

Cost structure. The core costs of the services can be divided into four categories:

1. the cost of the acquiring advertisers and running the campaign;

2. the cost involved in the development and management of the application;

3. the cost of free data access provided to the users while downloading the application the first time and viewing advertisement thereafter; and

4. the cost of free talk-time offered to users.

Revenue structure. The service is sold as an advertisement offering to corporates. Corporates pay a fee based on the number of views of their advertisement to the network operator. The operator keeps almost 70 per cent revenue and distributes the rest among application partner and content aggregator.

Figure 1 Eco-system for the mobile advertisement service
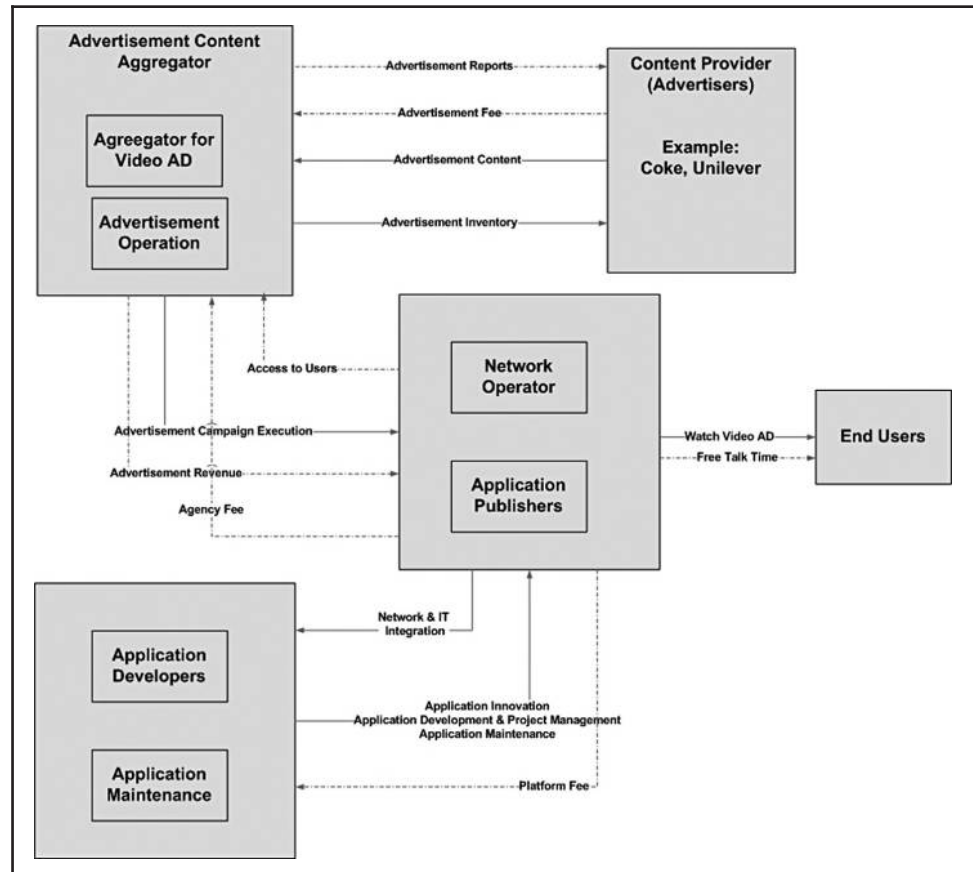
Resource required for the service. Table II lists the key resources provided by the ecosystems participants, dividing the resources into two categories: essential and complementary. Here the definition of essential resource is in line with the definition of critical and important resource, as specified in RDT (Pfeffer and Salancik, 1978). Customer, network and billing resources owned by the operator are listed as essential resource, as those resources are critical to the service development and there is no alternate provider for those resources, other than the operator. The resources related to advertisement and contents are listed as complementary, as they are critical to the service but available from

Table II Key resources offered by ecosystems partners

Participant in ecosystems	Resource	Resource classification
Operator	Access to Customers	Essential
	Network	Essential
	Billing	Essential
	Customer Profile Information	Complementary
	Location Information	Complementary
Application developer	Application Innovation	Complementary
	Application Development and Project Management	Complementary
	Application Support	Complementary
Content aggregator	Acquiring Advertisers	Complementary
	Business Operation of the service	Complementary
Content partner/advertisers	Advertisement Content	Complementary
	Advertisement Fee	Complementary

multiple providers. Customer profile information has also been listed as complementary, as it can be obtained from multiple sources, including the operator's own subscriber database. Alternately, the advertisement application can collect this information directly from the users by asking them to register. Location information has been listed as complementary, as it is not necessary for providing the services, although it increases the ability to provide contextual advertisement.

Control mechanisms as used in the service innovation phases

In this section, we identify the three phases and explain the key activities performed in these phases (Table III). We also associate the key resources and control mechanisms with the phasing constructs.

Association between phasing and control types

During the development phase, the key resources required were application innovation and application development. These resources were used for the conceptualisation and development of business model for the service, as well as for creating proof or concepts. The lead organisation did not have these capabilities, and the interviewees mentioned that they wanted to acquire these capabilities from an external partner. The respondents indicated that, while starting the conceptualisation work, they first selected the application provider. The interviewees from both the operator and the application provider mentioned

Table III	Characteristics of each phase of mAD service development		
		Phases of mobile service development	
	Development	*Implementation*	*Commercialization*
Time line	February-May, 2012	April-December 2012	October 2012 onwards
Actors involved	Operator, Application provider	Operator, Application provider	Operator, application provider, content aggregator, content provider
Resources of partners (non-structural players)	Application innovation	Application development and project management	Application support Acquiring advertisers Business operation of the service Advertisement content Advertisement fee or revenue
Typical input control parameters	Selection of application provider based on past experience and experience particularly in Brew platform Provides application provider access to the network of the operator Selection of Advertisement aggregator		
Typical behavioural control parameters			
Typical outcome control parameters	Decision on target device (Launch of service only on android and low end Brew devices)	Final functional specification of requirements Brand guidelines to be evaluated at delivery Monitoring project time line Daily project review call Testing of application by business users and revenue assurance team after delivery Modification of initial business plan after major decisions (Business plan is updated to drop the idea of providing free content to end users)	Guidelines for advertisement content Commercial guidelines for new advertisers Business plan Application support SLA Change request for new features
Most used control	Input control	Primarily outcome	Primarily outcome

that this specific application provider has very good experience and capability in application development in Brew, which is rare in the market. In addition, both of them (the operator and the application provider) have worked successfully together for many other VAS services. According to the IT product manager from the operator, it is difficult to find a vendor in India, with strong expertise in application development in Brew. The product manager from the operator also said: "No other provider has that much experience in Brew space like this application provider. They are already connected with us and integrated with our network. So, the same set up and knowledge can be reused". The service is primarily targeted at subscribers owning two types of devices: devices based on Brew and Android. So, it was important that application provider should have strong capability in mobile application development in Brew and Android. Similarly, the content aggregator was selected based on their already existing tie-up with multiple advertisers and their close working relationship with the application provider. These insights lead to our first proposition:

> P1a. During the development phase, input control is used more frequently compared to other modes of control.

In the implementation phase, the operator already has on-boarded the application provider. The application provider has to complete three activities in this phase. The application provider completes the application development in accordance with the functional requirement provided by the operator. Second, it also completes the integration with IT and network of the operator. It also completes different kinds of testing and validation. For these three activities, the lead player managed the application developer based on their compliance to the agreed requirements and time line, instead of going into details about how these features and integration requirement need to be achieved. There are few reasons, the primary one being that the controller (the operator) considers the controlee (the application provider) knowledgeable in their domain. So, after bringing in partners with the appropriate skills and attitude (input control), the structural partner wanted to rely on their capabilities instead of specifying and monitoring their behaviour or activity sequences. Next, because the service being developed is new and innovative, the controller did not have the expertise needed to implement or monitor behavioural controls. In addition, due to the fact that the application development team of the application provider and the IT team of the operator are located in different cities in India (Indore and Gurgaon), it was difficult to implement behavioural control. Besides, the short and aggressive time line made it more difficult to implement behaviour control, as imposing and reviewing behavioural control requires more time and effort. The IT product manager from the operator confirms this: "We are only concerned about how the application looks like at the end and how it functions".

This leads to the next (related) propositions:

> P1b. During the implementation phase, outcome control is used more frequently compared to other modes of control.

> P1c. High occurrence of input control reduces the occurrence of behavioural control in the implementation phase.

> P1d. High occurrence of input control increases the occurrence of outcome control in the implementation phase.

In the commercialisation phase, the operator needed the application provider to manage the technical operation of the application, as well as develop new features. The operator monitors and controls the application provider's application maintenance work through agreed systems availability metrics (SLA) mentioned in contract, and new enhancements to the applications are introduced through a standard change request process. Also, in this phase, the service availability and coverage to end users depends on advertisement inventory available with the operator, which means, on-boarding more advertisement

partners becomes very critical. To facilitate this work, the operator provided a set of guidelines for advertisement providers instead of directly becoming involved in their selection. The advertisement providers are managed through outcome controls like guidelines and contracts. Mostly the advertisement aggregator in the ecosystems brings these advertisement providers and also manages the advertisement operation. The operator manages and controls the advertisement aggregators through its ability to bring new revenue by acquiring new advertisement providers, instead of going in depth on how to achieve this. This leads to the following propositions:

P1e. During the commercialisation phase, outcome control is used more often compared to other modes of control.

P1f. Behavioural control (continuous, day-to-day monitoring) is not used in any of the phases.

Objectives served by portfolios of control

Table II illustrates that the operator possesses the essential resources for this service. As a result, it can occupy the position of the structural player or the leader of the ecosystem. But, because the service development requires diversified capabilities, which are not owned by the operator alone, it needs to on-board relevant partners who possess those capabilities. The operator's control portfolio is created in such a manner as to acquire the right capabilities. Acquiring application provider and content aggregator through input control are primary examples of this. In the commercialisation phase, the success of the service depends on enough persuaded advertisers to participate. The operator achieved this through outcome control, by specifying the guidelines for content, as well as commercial construct. The decision to use outcome control is logical, knowing that advertisement content would be acquired from a large number of partners instead of a few carefully selected ones partners, which is why we propose the following proposition:

P2a. The dominant player or the ecosystems leader uses control mechanisms to acquire complementary resources from other partners required for the service.

From our discussion with respondents, we found that the revenue generated by this service is shared unevenly among the partners. Almost 70 per cent of the earned revenues goes to the operator, while the application provider and advertisement aggregator receive the remaining. The application provider does not receive any other service or license fees for application development and support, other than the revenue share. According to the respondent from application provider, the application provider does not receive additional fees for executing minor change requests. Similarly, even though the aggregator brings in the advertisers, the contract with and fee paid to the aggregator is determined by the operator. This leads to the next proposition:

P2b. The dominant player or the ecosystems leader uses control mechanisms to receive a higher revenue share compared to other partners.

During different phases of the services, the different partners in this the ecosystem need to interact among themselves, as well as with other network and IT vendors of the operator. For this service, there are a few instances where the application provider needs to integrate with the network of the operator for call disconnecting and reconnecting after viewing the video advertisement. Because the network vendors of the operator did not want to make any changes on their side, the operator convinced the application provider to develop this algorithm in its application. Similarly, the entire logic for call credit to users was developed within this specific application, as any changes in operator billing and payment systems were found to be time-consuming. The operator also had to mediate and resolve when there are unresolved issues, as well as undefined responsibilities between advertisers, aggregators, application providers and operator's network and billing vendors. The operator used the control portfolio effectively to influence partners and manage these

dependencies or any conflicts between the other organisations involved, which leads us to the following proposition:

> *P1c.* The dominant player or the ecosystems leader control mechanisms to govern dependency among other value network partners.

The propositions that were developed on the basis of the first case were further validated and developed based on the next case.

The Caller Ring Back Tune case

The second case study involves the Caller Ring Back Tune (CRBT) service provided by another Indian mobile operator, a personalised audio or music service to which the calling party listens. In this service, after dialing, and prior to the call being answered, the caller hears an audio selection that has been predetermined by the party they are calling, which can range from popular songs to personalised messages. Instead of one single audio tune, the subscribers can opt for a bundled pack, with caller party listening to different tunes in the bundle, based on different conditions, like time of day, in a random sequence or based on the called party's preferences.

This mid-sized operator has around 6.5 per cent of national market share for mobile services in India and is different from the operator mentioned in the earlier case. The CRBT service is offered as a subscription service to its subscriber base. CRBT is considered the most successful mobile VAS service in India to date, responsible for almost 25-35 per cent of the total mobile VAS revenue for the telecom operators.

Ecosystem. The ecosystems consists of the telecom service provider, its IT partner, two application or platform providers, a number of content providers/aggregators (for example, Hungama and Techzone) and content owners (for example, T-Series and Sony Music). The two key content aggregators (Hungama and Techzone) provide access to almost 70 per cent of all Hindi and Indian regional language content.

The ecosystems delivering the service is shown in Figure 2.

Business model. Next, we discuss the core elements of the CBRT business model, before addressing the phasing and control mechanisms.

Value propositions. The value for customers of this service is that they can demonstrate their fashionability, personality and attitude to their callers by selecting particular songs or audio as a preferred mobile tune. The service is also used by individuals and enterprises to advertise. Users can create customised audio advertisement, which all the callers would hear, every time they call. For large film production companies, for instance, this is a way to make their song popular and create additional revenue.

Cost structure. The core costs of the services can be divided into three categories:

1. the cost of content, including royalty and conversion;

2. the costs involved in the development and management of the application and platform; and

3. the costs of sales and advertisement.

Revenue structure. The service is sold as a subscription service, creating recurring monthly revenues for the partners in the ecosystem. The revenue stream has two components, i.e:

1. monthly subscription for the core services (at present, it is INR30 or US$0.5 per month); and

2. revenues from services for song download (at present, this is INR15 or US$0.25 for every change or 45 days, whichever is earlier).

Revenue distribution. In terms of the distribution of revenue among the partners, the telecom service provider or network operator pockets on average 60 per cent of total

Figure 2 Eco-system of CRBT service
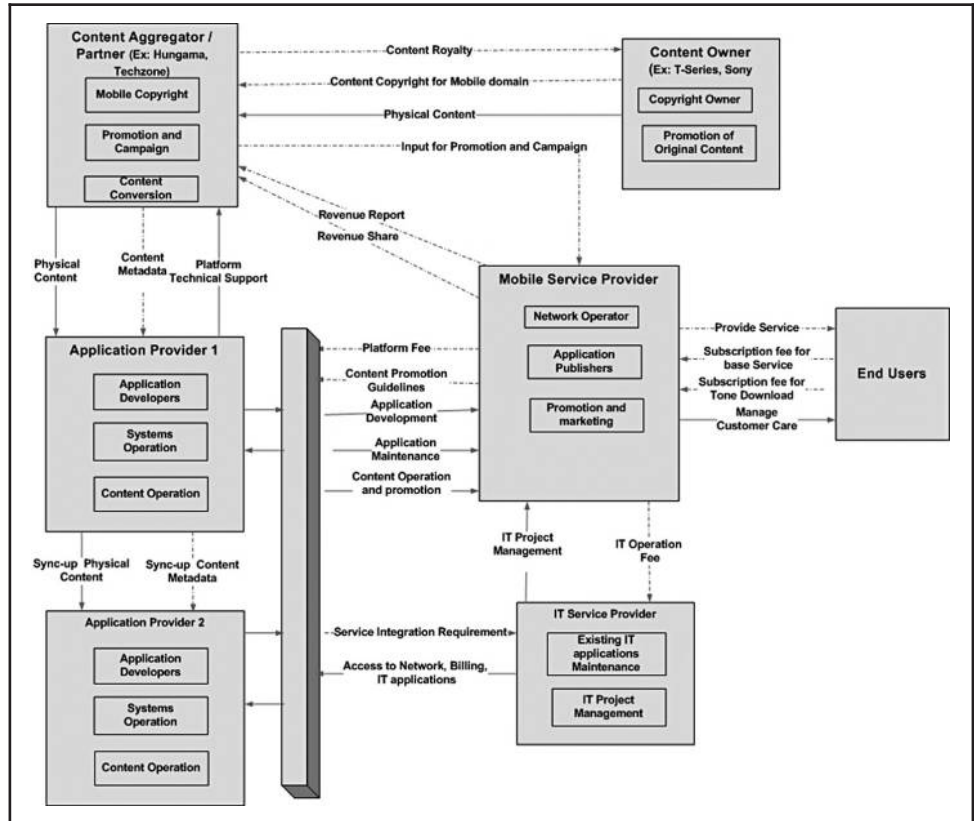
revenue. The application and platform provider receives around 15 per cent of total revenue, and the content partners or aggregators around 20-30 per cent. Content partner further shares the revenue with content owner. The revenue share with content partner varies and depends on content strength and the volume of business their content generates. The revenue share of large content aggregators (like Hungama or Techzone) generally has two components: minimum guaranteed amount, as well as revenue share for additional revenue earned, once the condition specified for minimum guaranteed amount has been met.

Key resources required for the service. The CRBT-service is an operator-centric service, due to the dependency on the Home Location Register component of the network. Table IV shows the resources provided by each partner and their classification into either essential and complementary. We used the same definitions mentioned in the first case. The four resources supplied by the operator (network, billing, customer base and customer profile information) are listed as essential services. In this service, customer profile information is mentioned as essential, as some part of this information is used to charge or bill the user or end-customer.

Control mechanisms as used in the service innovation phases. We followed the same approach as in the first case by first describing the key activities in each phase. The project started in the middle of 2008. The operator asked a group of product managers to conceptualise and plan various VASs including CRBT. The team followed the product management processes, created the product notes and shortlisted and selected the vendor. In addition, the operator has an ongoing IT outsourcing relationship with an IT service provider, which acts as its IT arm.

The IT service provider's main role for this application was to manage the dependency in other IT systems, generally referred as operation support systems/business support

Table IV Resources for CRBT ecosystems		
Participant in ecosystems	Resource	Resource classification
Operator	Access to customers	Essential
	Network	Essential
	Billing	Essential
	Customer profile information	Essential
	Customer care	Complementary
	Promotion and campaign	Complementary
Application developer	Application development	Complementary
	VAS domain knowledge	Complementary
	Application support	Complementary
	Content business operation	Complementary
IT service provider	Project management	Complementary
	Integration and modification of existing IT applications	Complementary
Content owner	Create and own new music, movie and other content	Complementary
	Promotion of these content	Complementary
Content partner	Mobile right of the content	Complementary
	Content business operation	Complementary
	Promotion and campaign	Complementary

systems (OSS/BSS). Many of these systems were impacted by the implementation of CRBT. Based on the agreed functional requirement, the application developer started customisation and integration of the application in January 2009. The initial launch of the service took place in June 2009 for a few locations, and the service roll-out for all areas of operation was completed by March, 2010.

Once the application was implemented and became popular, product managers from the operator started experiencing the problem of inflexibility and lack of attention from their application provider. According to the respondents from the operator, because of their strong product, the first application provider got multiple operators as their customers. To support the wide customer base, the first application provider's product team preferred product consistency instead of the rapid introduction of new features demanded by the operator. To introduce competition, the operator introduced a smaller, more agile new entrant in the CRBT application space, as their second application vendor. The process of identifying a second application provider started at the end of 2010. The second application provider was selected in mid-2011 to implement their application for four telecom circles (equivalent to states) in the Eastern part of India. The implementation work of the second application provider mostly consists of migrating users from the first application provider to the second provider and carrying out the technical integration between these two applications. The migration ran into trouble, due to a conflict between two application providers. As a result, the migration took more than a year and was completed in September 2012, with the active involvement of operators. Table V summarises the association between key resources, control mechanisms with phases of the service.

Association between phasing and control types

All the people who were interviewed (operator, platform partner and content aggregators) confirmed that, in the development phase, one of the most important activities is to identify and select a partner for CRBT application. Like all mature organisations, the operator went through an elaborate partner selection process based on the evaluation input from their technology, business and supply chain teams. Both the product managers from the operator, who played a key role in selecting the first CRBT application provider, explained that the selection of first application provider can be attributed to multiple factors. The primary factor is its strong domain and industry knowledge of the VAS business in India,

Table V Characteristics of each phase of CRBT service development

		Phases of mobile service development	
	Development	*Implementation*	*Commercialization*
Actors involved	Operator, application provider, IT service provider	Operator, Application provider, IT service provider	Operator, application provider, content aggregator, content owner
Resources of partners (non-structural players)	Application development VAS domain knowledge	Application development Project management System integration Application validation	Application support Content business operation Promotions and campaigns Content copyright for mobile VAS domain Knowledge
Typical input control parameters	Selection of first application provider based on proven product, domain knowledge Selection of 2nd application provider based on their responsiveness, agility and innovativeness Access to network, IT for Platform partners		
Typical behavioural control parameters	–	Detailed integration specification between two application providers Functional specification of requirements Monitoring of project schedule/ timeline Testing of application by business users and revenue assurance team Division of area of operation between multiple application providers Weekly project review call with partners	Joint promotion and campaign design with partners Content upload schedule for partners Guidelines for content Price setting for different variants of products Revenue target for partners Penalty for guideline violation Higher revenue share for larger content partners System availability target
Typical outcome control parameters			
Most used control	Input	Primarily outcome, occasionally behavioural	Primarily outcome, occasionally behavioural

while some of its competitors were seen as technology players, who lacked the market and domain knowledge. One of the product managers responsible for the evaluation said: "We felt that it is better to have a product team with deep domain knowledge in VAS market, rather than an engineering team as partner". The other factor that worked in its (first application provider) favour is its strong presence with other operators. In addition, both product managers of the operator also had prior and positive experience with this CRBT application vendor, while they worked with another Indian operator.

After a successful launch of the service, the operator discovered that the application provider selected, is not very agile and not aligned to their vision of introducing rapid incremental innovation to the product. As one of the product managers of the operator put it: "They (the first application provider) lost interest in our account. They have grown bigger and went global. So, doing even a small change was becoming a challenge". Faced with such a situation, the operator decided to introduce a smaller, but more innovative, second application partner, which resulted in the parallel existence of development and commercialisation phase in the service. While the second application provider was going through the development and implementation phase, the service offered by first provider was already in its commercial phase. In this second instance of the development phase, the operator again put a lot of effort in identifying a suitable agile, innovative partner, who understands the mobile VAS market and has knowledge of the operator's existing IT and network, to enable easy integration. The operator selected a smaller player as second application provider, who had no prior experience in CRBT implementation, but who had

worked with the operator in many other VAS trajectories. According to the relationship manager of the second application provider: "The operator thought it (the first application provider) has the skills and competence, as it's product was widely deployed. So the operator selected it. But then the operator realises that, because of size and too many customers, they are not easy to handle for innovation and agile delivery. So, the operator brought us, though we are smaller and this is our first implementation for CRBT. But we have worked with the same operator for many projects and we know their team, their network. The first application provider has its advantage in terms of knowledge and already proven product, whereas we had our advantages of innovation and responsiveness".

Consequently, we can confirm that *P1a* is also supported in second case:

> *P1a.* During the development phase, input control is used more often compared to other modes of control.

The service life cycle also included the implementation phase twice, the first time when the first application provider customised, integrated and tested the application and the second time when the second application provider was introduced, leading to a fairly long user migration to the new platform. During both implementation phases, the key players were the operator, application provider and IT provider of the operator. To start the work, the operators created the requirements and jointly agreed on a time line for the delivery of different sub-activities. The application providers were responsible for detailed design, customisation, integration with different systems and for validation and testing of the solution. The second application provider had the added responsibility of user migration. The IT solution provider's prime role in this context was to facilitate integration of CRBT platforms with existing IT applications.

To manage these entire sets of activities, the operator, together with the other partners, agreed on a high-level project plan with detailed activities and sub-activities. The operator used to conduct daily or weekly review meetings to monitor the progress of the implementation, review deviation from agreed plan and assign the issues to the appropriate organisations. The operator did not go into detail with any of the implementation activities and it did not share any guidelines, templates to the players, advising them about the implementation. This fact was confirmed by the respondents from the operator, as well as the platform providers. The relationship manager of second platform provider confirms: "The operator is more interested on the features to be rolled out. They focus on output instead of how you do it. They don't tell you how, but they tell you the results they want". Similarly, one of the product managers of the operator said: "When the platform partner is doing coding, we are not involved. They implement the systems as per the agreement and we do the testing".

Consequently, we can confirm *P1b* based on the second case:

> *P1b.* During the implementation phase, outcome control is used more frequently compared to other modes of control.

However, there are some scenarios where the operator was be forced to conduct a more detailed management of the partners. This happened when the operator brought in the second platform partner. The product manager of the operator mentioned the serious challenges and complexities they faced while migrating the subscribers of one market segment (eastern part of the country) to the new platform. The operator was forced to do sometime deep dive into the problem and create technical and business rules related to subscriptions, content and users, to facilitate interaction between the two CRBT applications provided by two different providers. Consequently, we can confirm *P1f* is not supported here case:

> *P1f.* Behavioural control (continuous, day-to-day monitoring) is not used in any of phases (Not Supported).

Similar to the first case study, the dominant actor had a strong preference for outcome control in the implementation phase. One of the reasons for the low level of behavioural control is that, due to the evaluation process and other processes related to input control, the operator perceived the platform partners as being very knowledgeable in the application domain. During the discussion, both the product managers of the operator emphasised repeatedly that the platform partners had more in-depth knowledge of their product and could provide better insight on how to use the product feature to achieve the operator's business objectives. Besides, the operator team consists of primarily business-oriented managers who wanted to focus on growing business and allowed the platform partner to act independently in implementing and managing the application. The following quote from second product manager of the operator highlights this.

"In this and also in my earlier assignments, I have seen, it is the platform partner who has more knowledge about the platform features, how new products can be launched quickly through the platform". All this means that *P1c* and *P1d* are supported by the second case:

P1c. High occurrence of Input control reduces occurrence of behavioural control in implementation phase.

P1d. High occurrence of Input control increases occurrence of outcome control in implementation phase.

During the commercialisation phase, the key players were the operator, platform providers and content aggregators or providers. Although there were a large number of content providers (more than 50), the selection process of the content partner and aggregator was not as exhaustive as that of the application providers. To be able to provide a greater variety of content to end users and ultimately to increase the revenue from the services, the operator wanted to enlist as many content partners as possible. Besides, because a content partner or aggregator has copyright over the specific content, the operator did not have any option of acquiring the same content from alternate partner. So, instead of focussing on evaluating and selecting a content partner, the operator decided to use them effectively by managing the relationship, primarily based on content partner's contribution to revenue. Some of the content partners, like Hungama and Techzone, performed better than others, as they have copyright of most of the new releases of music in India, as well as a focus on promoting and selling content. The more important content partners are rewarded with a minimum guaranteed amount, higher revenue share, as well as their contents are promoted more than others.

In the commercialisation phase, the application providers have two important roles. The first one is to provide application support and maintenance services, with a focus on system monitoring and managing systems uptime. This is predominately spelled out in their contract as an SLA requirement, which is monitored and measured by the operator and linked to the application partner's payment. Again, the operator does not go into details on how to achieve the SLA targets, but specifies, monitors and measures them. The operator, application provider and content partners also work together during the commercialisation phase for the day-to-day content-related business and sales operations. The main activities involved are creating different variation of products, the organisation of content in different categories, running the campaigns and promoting content, as well as creating and interpreting reports and analytics. The telecom operator considered this an important part of the sales process and managed this activity through direct involvement or through detailed guidelines. According to different respondents, content partners push their content and provide information, ideas for campaigns and promotion. The sales manager from the operator analyses those, as well as their own analytics, and decides what needs to be done in terms of campaign, promotion and product launch. The application partner executes those requirements, guidelines or instructions received from the operator's team. This can be verified from the below quote from one of the account manager of the content provider.

"For campaign and promotion, we (Content Partners) are very much involved with the operator for both planning and execution. Our people are sitting there with the operator for 365 days. They keep on interacting and working on a day-to-day basis on which content to sell, if some contest need to be organised in a particular way, what are the packs and plans. We work on these taking into account if we do this we are going to earn certain amount of additional revenue". So for sales operation, the operator takes a more hands-on approach and does day-to-day monitoring. *P1e* is supported:

> *P1e*. During the commercialisation phase, outcome control is used more compared to other modes of control.

While it is confirmed that *P1f* is again not supported in this case because behavioural control is used to a lesser extent in the commercialisation phase:

> *P1f*. Behavioural control (continuous, day-to-day monitoring) is not used in any of the phases (Not Supported).

Objectives served by portfolios of control

All the managers who were interviewed agreed that the operator had a very important role to play for CRBT service, and other players cannot offer CRBT service directly without the involvement of operators. Most of the other mobile entertainment VAS can be offered via competing platforms, which are led by device player or large content provider. However, those two competing platforms cannot offer CRBT service due to its dependence on network of operator. This and the fact that CRBT is a very successful VAS service with high revenues allow telecom operators to influence the value network for their own benefit.

In terms of resource distribution, the structural players provided the essential resource of network, customer base and billing systems. However, no effort was made by the operator, the ecosystems leader to develop complementary assets, like application development and audio content for CRBT. Because the network operator possesses essential resources, it could easily select first and second platform providers, force the first to collaborate and accept the competition. The operator also managed to establish a relationship with two large content aggregators and a number of content partners under the condition of the dominant actor. The operator can manage acquisition and subsequent management of these partners through a portfolio of (input and outcome) control mechanisms. The portfolios of control in the different phases were used to acquire complementary resources without which the operator cannot develop and create the service. This confirms *P2a*:

> *P2a*. The dominant player or the ecosystems leader uses control mechanisms to acquire complementary resources from other partners required for the service.

From the interviews, it was confirmed that the telecom operator receives a higher share of the total revenues. On the other hand, the operator does not need to invest significantly in the service, as the application development and support was organised by the application partner. The acquisition of copyright of content and content management was carried out by content partners. The operator, however, maintained the right to decide on service pricing, and on the launch of any variant of the service. The revenue settlement process between operators and other partners is also actively managed by the operator. The other partners accepted the report from the operator as a reference for settlement, the content provider has no other way of knowing the actual business being conducted. The quote from one of the product managers of the operator explains the pressure on partners to reduce their share of value: "We pressurise the application partners to reduce their revenue share". The content provider mentioned the low revenue as a stumbling block for their investment in sales, marketing and product innovation. In some cases, the product manager from the operator listed low revenue shares for partners, as well as the delay in sharing revenue, as key concerns being raised by the partners. The partners also tried a number of times to demand and justify a higher share of revenue. The account manager of one of the content

partners mentioned that the attractiveness of content is one of the ways to influence the network operator for a higher revenue share. Another account manager mentioned that they are trying to receive higher revenue share by involving more in promotion and showing direct contribution in subscriber acquisition. This leads to the confirmation of the *P2b*:

> *P2b.* The dominant player or the ecosystems leader uses control to receive a higher revenue share compared to other partners.

Another interesting aspect of this multi-organisation collaboration is that different participating organisations only have a contractual agreement with the structural or lead player (the operator). There is no contractual agreement or formal understanding between any of the other players. As multiple team works together (application, content, IT service provider), the operator uses its influence to manage the dependencies, which can be related to co-operation required from each other, as well as possible changes that is required in different application due to the integration. The following quote from the second product manager from the operator confirms this:

> The agreements are between the operator and application partner and between the operator and content partners. whenever anyone, specially a content partner, has a problem, they come to us, the operator. Then we use to sit with both the teams, platform partner and content partner and understand what the issue is and try to resolve it. Sometimes our IT team is reluctant to make changes on their application, So, it is always the application partner who has to change. One of the benefits of having a partner outside our organisation (the operator) is that you can mould them.

In this particular case, when the second application provider was introduced, no agreement was made between the two application providers, even though they need to work very closely during, as well as after, the initial service migration period. During the post-migration period, content partners only upload content in the application of first application provider, from where it got synched up with the platform of second application provider. During the service migration from first platform partner to second, the operator had to step in frequently, and sometime force the unwilling first platform partner to cooperate. Similarly, on an ongoing basis, for any communication between these platform partners, they always keep the operator in the loop. The relationship manager from the second application provider said "The first application provider had a contract with the operator. We (the second application provider) also had a contract with the operator. The worst thing, which did not work properly in this project, is that there is no formal agreement between the two CRBT application providers on how to conduct business. If we have some dependency with the first application provider, we cannot do anything. All we can do is to escalate to the operator and hope they will do something".

Similarly, there is no understanding and agreement between content partners and platform partners. For all these relationship, transaction and disputes, the structural player has to manage the interdependency between these players and resolve any conflict. Again, the proposition as formulated for the first case is confirmed:

> *P2c.* The dominant player or the ecosystems leader uses control to manage dependency among other value network partners.

Discussion, conclusion and limitations

The research findings show that, in mobile ecosystems, initially, input control or the selection of relevant partners with key resources is important. In later phases, outcome control becomes important. Behavioural control is not a key factor in any of the phases. In part, this can be explained by the fact that network control mechanisms that are related to hierarchical relations, like behavioural control, do not appear to be aligned with the network configuration. As De Reuver and Bouwman (2012) have shown, in the initial phase, governance mechanisms based on authority play an important role. Although behavioural

control would match such a governance model, due to the specific nature of the initial phases, a focus on the selection of partners with critical resources makes input control more likely to be the dominant control mechanism. Further research into governance mechanisms and the role played by (portfolios of) control mechanisms may provide more insight into this area. Specifically, the relationship between governance mechanism, authority, trust and contract-based governance with portfolios of control mechanisms needs further exploration. Embedding this research in the increasing stream of research involving the relationship to platforms and ecosystems may prove to be fruitful. In that context, it is striking that the providers of the technical platform occupy a less central position in the value network. The technical resources are apparently not as essential as one might expect.

The study also confirms that the structural player depends on input control to bring capable partners on board. Once a partner is on board, the structural player manages that partner's activities through outcome-oriented controls. In addition to the "network" governance mechanism, as discussed due to the lack of technical expertise and the lack of interest in details, dominant players avoid the more detailed monitoring required for behavioural control, although there are instances when behavioural control is used to a limited extent in the implementation and commercialisation phase. The dominance of a specific actor within an ecosystem and the way the dominant position is achieved and maintained based on the use of control mechanisms may warrant closer consideration.

In the cases discussed in this paper, the dominant structural players used control mechanism to achieve three important objectives: to acquire complementary resources so that the service can be developed, to ensure a favourable value share and to manage interdependencies between partners. The other partners always communicate with the other partners via the dominant structural player and use the dominant player's influence to persuade others to cooperate. The findings also confirm that different resources become critical in different phases of the service development and roll-out, and, as a result, the dynamics of resource-dependency also lead to changes in the portfolio of control, mainly shifting from input to outcome control. These dynamics are also observed when business models dynamics are discussed, in phasing models for start-up companies, or in studies that discuss the shift from exploration to exploitation phases.

A limitation of this study is that it is based on two cases in a specific regulatory, cultural and institutional environment, i.e. India, which means that further testing of the propositions, with large-scale samples and within a more international setting, would be required. However, this study does provide some interesting insights that have to be corroborated by additional case studies and a large-scale questionnaire, initially with a focus on India. From an academic perspective, this study examines organisational controls in a less researched yet dynamic services industry, and is one of the first studies that the researchers have come across that uses RDT to explain the dynamics of control in value networks in the mobile industry. This study is also one of the very few to focus on understanding the objectives of the portfolios of control from the perspective of the structural player. As mentioned earlier, research focussing on integrating governance mechanisms and portfolios of control may provide new insights.

From a practical perspective, this study may shed light on how to develop mobile services in collaboration with other organisations. India is the second largest market for mobile services (in terms for number of mobile users) in the world, but revenues from mobile VAS services are much lower compared to other developed and developing markets. Understanding control can provide important insights for managers and policy-makers alike in India, so that innovation in mobile VASs can be accelerated. Innovation in VASs would have a positive impact on revenue, increase customer loyalty and improve brand image for service providers.

References

Adler, P.S. and Borys, B. (1996), "Two types of bureaucracy: enabling and coercive", *Administrative Science Quarterly*, Vol. 41 No. 1, pp. 61-89.

Alam, I. and Perry, C. (2002), "A customer-oriented new service development process", *Journal of Services Marketing*, Vol. 16 No. 6, pp. 515-534.

Ballon, P. (2007), "Business modelling revisited: the configuration of control and value", *Info*, Vol. 9 No. 5, pp. 6-19.

Ballon, P. (2009), *Control and Value in Mobile Communications: A Political Economy of the Reconfiguration of Business Models in the European Mobile Industry*, IBBT-SMIT, VUB, Brussels, Belgium.

Barry, C.A. (1998), "Choosing qualitative data analysis software: Atlas/Ti and Nudist compared", *Sociological Research Online*, Vol. 3 No. 3, available at: www.socresonline.org.uk/3//4.html

Beath, C.M. (1987), "Managing the user relationship in information systems development projects: a transaction governance approach", *Proceedings of the 8th International Conference on Information Systems, Pittsburgh, PA*, pp. 415-427.

Bouwman, H., Haaker, T. and De Vos, H. (2008), *Mobile Service Innovation and Business Models*, Springer, Heidelberg, ISBN 978-3-540-79237-6.

Cardinal, L.B. (2001), "Technological innovation in the pharmaceutical industry: the use of organizational control in managing research and development", *Organization Science*, Vol. 12 No. 1, pp. 19-36.

Carlsson, C., Walden, P. and Bouwman, H. (2006), "Adoption of 3G+ services in Finland", *International Journal of Mobile Communications*, Vol. 4 No. 4, pp. 369-385.

Choudhury, V. and Sabherwal, R. (2003), "Portfolios of control in outsourced software development projects", *Information Systems Research*, Vol. 14 No. 3, pp. 291-314.

De Reuver, M. (2011), "Governance of mobile service innovation after the walled gardens", *Info*, Vol. 13 No. 1, pp. 43-60.

De Reuver, M. and Bouwman, H. (2012), "Governance mechanisms for mobile service innovation in value networks", *Journal of Business Research*, Vol. 65 No. 3, pp. 347-354.

Eisenhardt, K.M. (1985), "Control: organizational and economic approaches", *Management Science*, Vol. 31 No. 2, pp. 134-149.

Eisenhardt, K.M. and Graebner, M.E. (2007), "Theory building from cases: opportunities and challenges", *Academy of Management Journal*, Vol. 50 No. 1, pp. 25-32.

Faber, E., Ballon, P., Bouwman, H., Hakker, T., Rietkerk, O. and Steen, M. (2003), "Designing business models for mobile ICT services", paper presented at 16th Bled Electronic Commerce Conference, Bled, Slovenia.

Gerpott, T.J. (2011), "Attribute perceptions as factors explaining mobile internet acceptance of cellular customers in Germany – an empirical study comparing actual and potential adopters with distinct categories of access appliances", *Expert Systems with Applications*, Vol. 38 No. 3, pp. 2148-2162.

Govindarajan, V. and Fisher, J. (1990), "Strategy, control systems, and resource sharing: effects on business-unit performance", *Academy of Management Journal*, Vol. 33 No. 2, pp. 259-285.

Harmancioglu, N. (2009), "Portfolio of controls in outsourcing relationships for global new product development", *Industrial Marketing Management*, Vol. 38 No. 4, pp. 394-403.

Jaworski, B.J. and MacInnis, D.J. (1989), "Marketing jobs and management controls: toward a framework", *Journal of Marketing Research*, Vol. 26 No. 4, pp. 406-419.

Jaworski, B.J., Stathakopoulos, V. and Krishnan, H.S. (1993), "Control combinations in marketing: conceptual framework and empirical evidence", *Journal of Marketing*, Vol. 57 No. 1, pp. 57-69.

Johnson, S., Menor, L., Roth, A. and Chase, R. (2000), "A critical evaluation of the new service development process: integrating service innovation and service design", in Fitzsimmons, J. and Fitzsimmons, M. (Eds), *New Service Development - Creating Memorable Experiences*. Sage Publications, Thousand Oaks, CA, pp. 1-32.

Johnson, W.H.A. (2011), "Managing university technology development using organizational control theory", *Research Policy*, Vol. 40 No. 6, pp. 842-852.

Kerr, J.L. (1975), "On the folly of rewarding A, while hoping for B"", *Academy of Management Journal*, Vol. 18 No. 4, pp. 769-783.

Kim, J.S. (1984), "Effect of behavior plus outcome goal setting and feedback on employee satisfaction and performance", *Academy of Management Journal*, Vol. 27 No. 1, pp. 139-149.

Kirsch, L.J. (1996), "The management of complex tasks in organizations: controlling the systems development process", *Organization Science*, Vol. 7 No. 1, pp. 1-21.

Kirsch, L.J. (1997), "Portfolios of control modes and IS project management", *Information Systems Research*, Vol. 8 No. 3, pp. 215-239.

Kirsch, L.J., Sambamurthy, V., Ko, D. and Purvis, R.L. (2002), "Controlling information systems development projects: the view from the client", *Management Science*, Vol. 48 No. 4, pp. 484-498.

Li, F. and Whalley, J. (2002), "Deconstruction of the telecommunications industry: from value chain to value networks", *Telecommunications Policy*, Vol. 26 Nos 9/10, pp. 451-483.

Markus, M.L. (1989), "Case selection in a disconfirmatory case study"", *The Information Systems Research Challenge: Qualitative Research Methods*, Vol. 1, pp. 20-26.

Merchant, K.A. (1985), *Control in Business Organizations*, Pitman, Boston, MA.

Miles, M.B. and Huberman, A.M. (1994), *Qualitative Data Analysis*, Sage, Thousand Oaks, CA.

Moore, J.F. (1993), "Predators and prey: the new ecology of competition", *Harvard Business Review*, Vol. 71 No. 3, pp. 75-83.

Nikou, S. and Mezei, J. (2012), "Evaluation of mobile services and substantial adoption factors with analytic hierarchy process (AHP)", *Telecommunications Policy*, Vol. 37 No. 10, pp. 915-929.

Ouchi, W.G. (1977), "The relationship between organizational structure and organizational control", *Administrative Science Quarterly*, Vol. 22 No. 1, pp. 95-113.

Ouchi, W.G. (1979), "A conceptual framework for the design of organizational control mechanisms", *Management Science*, Vol. 25 No. 2, p. 833.

Ouchi, W.G. (1980), "Markets, bureaucracies, and clans", *Administrative Science Quarterly*, Vol. 25 No. 1, pp. 129-141.

Peppard, J. and Rylander, A. (2006), "From value chain to value network: insights for mobile operators", *European Management Journal*, Vol. 24 Nos 2/3, pp. 128-141.

Pettigrew, A.M. (1985), "Contextualist research and the study of organizational change processes", in *Research Methods in Information Systems*, North Holland, New York, pp. 53-78.

Pfeffer, J. and Salancik, G. (1978), *The External Control of Organizations: A Resource Dependence Perspective*, Haper and Row Publishers, New York, NY.

Pfeffer, J. and Salancik, G.R. (2003), *The External Control of Organizations: A Resource Dependence Perspective*. Stanford University Press, Stanford, CA.

Snell, S. (1992), "Control theory in strategic human resource management: the mediating effect of administrative information", *Academy of Management Journal*, Vol. 35 No. 2, pp. 292-327.

Stabell, C. and Fjeldstad, Ø. (1998), "Configuring value for competitive advantage: on chains, shops and networks", *Strategic Management Journal*, Vol. 19 No. 5, pp. 413-437.

Tidd, J., Bessant, J. and Pavitt, K. (2001), *Managing Innovation*. Wiley, New York, NY.

Tiwana, A., Konsynski, B. and Bush, A.A. (2010), "Platform evolution: coevolution of platform architecture, governance, and environmental dynamics", *Information Systems Research*, Vol. 21 No. 4, pp. 675-687.

Yin, R.K. (2009), *Case Study Research: Design and Methods*, Sage, Thousand Oaks, CA.

Appendix

Interview protocol

The following interview protocol was used as a reference for the semi-structured interviews. Depending on interviewee expertise and the information received from earlier interviews, the protocol was adapted.

Focus of interview. The interview would focus on collecting information about the below areas through interview protocol:

- Definition of the mobile VAS services and its value proposition to customer.

- Who are the partners in this particular value network?

- What are the key role played by each of the value network players during the design, implementation and roll-out of the services?

- Understanding the time line for development, implementation and roll-out of services.

- Key resources required during development, implementation and roll-out phase?

- Who provides and controls these resources?

- How the control portfolios used in this service have evolved and what have they achieved?

- Regarding the control portfolio, what went well, what was missing and what could have been improved?

General orientation. What do you do for your organisation and what is your role for this service?

A. Mobile service and its ecosystems

1. Understanding the services:
   - What is the service? Please specify how the discovery, fulfilment and end-user billing of the services take place? What is the most important value for the users of this service?

2. Understanding the ecosystems and resources:
   - What are the organisations involved in the development, implementation and roll-out of the services?
   - Which organisation controls access to the potential customers?
   - Which organisation controls access to user profile, preference?
   - Which organisation controls access to charging, billing of the users?
   - Is there any open API (application programming interface), SDK or similar features available for the service developer?
   - Who brings the content providers including the advertisers for the service?
   - Who has developed the client side application?
   - Who has developed the provider side application?
   - Are there any other resources relevant to the service?

B. Understanding the timeline for different phases

- Is the service now commercially available? Since when has it been commercially launched for all major users? How is the response? Has anything changed after the commercial availability of the service?

- When did the conceptualisation of the services first start and when it was completed? This includes service and product definition, business plan, partner selection and investment in technology?

- When does the implementation phase for the service start and end? This phase includes the development, testing and small-scale roll-out in a test market, alpha and beta version availability?

C. Understanding control portfolio

1. Input control:
   - How were the partners selected in the first place and on an ongoing basis?
   - Are there any evaluation criteria for selecting the partners?
   - What is the process to provide the partners with necessary information, as well as access to different systems?

2. Outcome control:

- What are the mechanisms used by lead partner to explicitly specify desired outcomes?

- How are these outcomes with respect to quality, timeline, cost and business impact measured?

3. Behavioural control:

- Other than monitoring the outcome provided by partners, are there any other guidelines, rules, processes and procedures, the partners need to follow while working for the outcome?

- What are those? How they are enforced and monitored?

4. Control overview:

- Among all the controls discussed, which one really worked well and why? How did these controls help the lead partner?

- What are the controls that were unnecessary or not properly implemented?

- Based on your understanding, are there any missing controls that should have been implemented?

- During different phases of the service, has the occurrence of particular types of control mechanisms increased or decreased?

D. Closing remarks

- What did you think about the conversation?

- Did I omit any questions I certainly should have asked? Do you want to add anything more?

- Do you have any questions yourself?

- Are there any persons or organizations I should also talk to, who have worked with you for this service?

About the authors

Sandip Mukhopadhyay works with IBM's Global Center of Competence for Telecom in India. He is also a research scholar in the Fellow Program of Management Development Institute (MDI), Gurgaon, India. His research interest includes innovation governance, business model for mobile service innovation and mobile ecosystems. Sandip Mukhopadhyay is the corresponding author and can be contacted at: sandipmukho@gmail.com

Harry Bouwman is appointed by The Finnish Academy of Science as Finnish Distinguished Professor at IAMSR, Åbo Akademi University, Turku, as well as Yuväskylan University, Yuväskylan, Finland. He is also an associate professor at ICT Section, Faculty Technology, Policy and Management, Delft University of Technology, The Netherlands. His research is focused on ICT and organizations; ICT Management; Strategy, Business models, and Enterprise Architecture; and on Mobile Cloud Computing and mobile services.

Mahadeo Jaiswal is a Professor in Information Management group in Management Development institute (MDI), Gurgaon, India. His area of research, consultancy and teaching includes Service Innovation Strategy, Process Reengineering, Enterprise Resource Planning (ERP), Cloud Computing and e-Government Implementation Models.

This article has been cited by:

1. Sandip Mukhopadhyay, Shahrokh Nikou, Harry Bouwman. 2016. Why Controls Are Used in Platform Ecosystems?. *International Journal of E-Services and Mobile Applications* **8**:3, 1-19. [CrossRef]
2. Sandip Mukhopadhyay, Mark de Reuver, Harry Bouwman. 2015. Effectiveness of control mechanisms in mobile platform ecosystems. *Telematics and Informatics* . [CrossRef]