Impacts of handset bundling on mobile data usage: The case of Finland

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Abstract

Promotion of the adoption of new services has emerged as a possible driver for the regulation of handset bundling and subsidies. Handset bundling, however, has complex implications not only on mobile data service adoption, the focus of this research, but also more broadly on the mobile market dynamics. Due to the complexity, regulators have difficulties in anticipating the possible resulting impacts. Using a case study, expert interviews, and usage measurements as research method, an empirical framework was constructed to make the service usage impacts more explicit. The framework enables the identification of the regulator’s steering options and their qualitative impacts. Results are based on observations before and after the change of law on handset bundling in the Finnish market. According to the findings, handset bundling regulation is a possible but risky tool for steering the market.

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1. Introduction

The bundling of a mobile handset and subscription, briefly handset bundling, is allowed in most countries since South Korea and Finland are the only countries that have prohibited handset bundling and the related handset subsidies by law. Recently, both countries have been experimenting with bundling regulation promoting advanced handsets. Notably, these two countries also have an exporting mobile industry with the highest impact on national economy.

The rather slow development of mobile data market, i.e. services and content based on Internet Protocol over cellular radio networks, increases the motivation to better understand the relationship between handset...
bundling and the adoption of advanced handsets and new services. Because of different market conditions and lack of solid evidence of the consequences of handset bundling, the bundling policies of regulators vary. Also the handset bundling strategies of mobile operators vary. Some operators (e.g. in Hong Kong) concerned about the higher costs of increasingly advanced handsets have announced intentions to reduce subsidies (Wong, 2005), while some operators (e.g. in Australia) have adopted subsidies for competitive reasons as the new 3G services are being deployed (Sainsbury, 2005). Due to handset bundling, mobile operators have challenged wholesalers and retailers as the major buyer of mobile handsets and, therefore, handset manufacturers are forced to adjust their product portfolios accordingly. For instance, the largest manufacturer, Nokia, introduced in 2005 its first handset model exclusively designed for a single operator.

Some regulators want to promote the adoption of new data services and consider handset bundling as a possible trigger, but they are also concerned over the anti-competitive effects of handset bundling. It appears that promotion of data service adoption with handset bundling requires skillful tuning of regulatory actions. The regulator needs to identify and understand the steering options of handset bundling affecting service usage—without forgetting the non-usage consequences of handset bundling regulation and the non-regulated factors affecting service usage.

This research clarifies the impacts of handset bundling by constructing a framework for the regulator's steering options and the related consequences on mobile data usage. Since the impacts are most visible in the context of market transitions between no-bundling and bundling, the Finnish market where a change of bundling law took place in 2005 was chosen as the basis of case study.

The paper starts with a review of the conceptual basis of bundling and continues by describing the chosen research strategy and the research environment. Then the results section includes a detailed description of the handset bundling framework and its application to the Finnish market.

2. Conceptual basis

2.1. Bundling

**Pure bundling** is used to refer to a situation where a number of products or services are offered for sale, but individual products or services in the package are not. **Mixed bundling** refers to a situation where consumers are given the option of buying the bundled package as well as the option of buying the individual products or services that make up the package. **Price bundling** refers to the bundle sold without any integration of the products, whereas **product bundling** assumes integrated products with added value to customers.

According to Eppen et al. (1991), the potential benefits of bundling include cost savings in production and transaction costs, complementarities among the bundled components, and sorting consumers according to their valuations. Jameson (2005) summarises the opinion of mobile service providers as follows: “the strategic goal of service providers with the deployment of bundled services is to acquire new customers, charge their current customers more, and keep the customers they already have.” On the other hand, according to Burstein (1960), firms can raise profits by tying complementary goods. Blair and Kaserman (1978) further argue that vertical integration and tying arrangements are alternative means of obtaining the same results.

Pure bundling can lead to a situation where the profits of all firms in the industry are higher (Chen, 1997), but on the other hand, bundling simplifies life for consumers by providing a single point of contact. Because of the possible anti-competitive and value-enhancing aspects, bundling is challenging for regulators.

2.2. Switching cost and lock-in

Lock-in can occur because it is costly for telecom operators to set up to serve new subscribers and because subscribers face a switching cost in changing operators. For example, in absence of mobile number portability, there is a lock-in effect on the mobile subscribers (Valletti & Cave, 1998). Correspondingly, low switching costs are often related to price wars (Klepper, 1989). Effects of lock-in can be further quantified by observing that in an idealized world the existence of switching costs results in equilibrium where the operators can obtain profits per subscriber comparable to the switching cost (Shapiro & Varian, 1999). Therefore, operators might have an incentive to inflate switching costs artificially.
2.3. Handset subsidy

A handset subsidy is the monetary value, i.e. the difference between the purchase price and the sale price of the handset, given to a customer during the subscription process. The operators typically offer the handset subsidy bundled with an obligatory subscription period during which the handset subsidy is recovered by the means of subscription fee, basic monthly charge, and airtime services. Thus, the usage of handset subsidies often leads to a strong lock-in effect because of long contracts and the SIM-lock, which the operators customarily activate to prevent the use of the handset in another operator’s network.

Regulators can use handset subsidies to steer the market. As a valuable example, the South Korean policy can be divided in phases: handset subsidy with an obligatory subscription period (1997–1999), handset subsidy without an obligatory subscription period (1999–2000), handset subsidy prohibited (2000–2004), and regulated handset subsidy allowed (2004–2006). The last phase allowed subsidies only for technically advanced handset models, i.e. maximally 40% subsidy for WCDMA (not for CDMA2000) handsets and maximally 25% subsidy for handsets with at least 2.7 in display. Due to the strategic importance of the mobile export industry in South Korea, the internal political debate on the future of handset subsidies has been intense (Kim, 2005). The South Korean case clearly illustrates the predictability problems related to regulated handset bundling (Kim, Byun, & Park, 2004; Han, Choi, Kim, & Chung, 2006).

2.4. Classification of handset bundling

Table 1 summarises the classification of handset bundling and the resulting degree of operator control on the market. Vendor handsets represent an extreme case where handset bundling is not used at all and the handset market is driven by handset manufacturers through retail channels that are relatively independent of operators. Finland used to be an example of this type of a market.

Operator handsets, on the other hand, represent another extreme case where handset manufacturers deliver exclusive types of handsets tailor-made according to operator specifications. In this case, a pure bundling of handset and subscription usually dominates. Operator handsets are likely to play a key role in markets where the level of vertical integration is high, e.g. in Japan with NTT DoCoMo and KDDI.

Co-branded handsets are a hybrid between the vendor and operator handsets. The relative negotiation power of the handset manufacturer and operator defines the level of operator control and the business characteristics as observable for instance in the UK. A co-branded handset typically has the operator and manufacturer brands visible on the handset cover. Operator’s services are often more integrated into the user interface than in vendor handsets. Co-branded handsets are often software-customized.

All handset types can co-exist on a market as for instance in the UK. In practice, operators tend to explore the market needs and their own capabilities by offering multiple handset types in parallel. From the subscriber point of view, the ease of taking operator’s services into use is likely to differ between the types of handsets. In the case of vendor handsets, the subscriber normally needs to configure the operator service settings by her/himself with the support of the operator’s more or less automated subscription set-up procedures. In the case of operator handsets, the subscriber typically receives a ready-to-use handset fully pre-configured for easy access to operator services.

3. Research method

In this research, a case study research strategy was used (see Yin, 1981). Finland was chosen as the case country because of its market transition from no-bundling to bundling and easy access to research data. Applying a multiple case study strategy on the two markets with relevant regulatory transitions, Finland and South Korea, was also considered but postponed due to lack of comparable data. However, although the framework is constructed for the Finnish market, the findings are compared with other markets when possible.

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5The subscriber identification module (SIM) and the mobile handset software can be technically configured so that they can only be used in a single operator’s network.
The research process has followed the principles of innovation action research applying the process of building theory from case study (Eisenhardt, 1989). The resulting framework was developed iteratively in multiple steps with industry experts.

The initial draft of the framework was presented, discussed and worked on in the LEAD project meetings held approximately monthly in the year 2004. The first round semi-structured theme interviews with industry experts was conducted in January–February 2005. The experts interviewed (n = 7) were from all the three licensed mobile operators (Elisa, TeliaSonera, and DNA) active in Finland and from the handset manufacturer Nokia. The updated framework was again presented and discussed in May 2005 in the LEAD seminar where the invited industry experts (n = 27) representing the regulator (n = 8), mobile operators (n = 9), mobile equipment industry (n = 5), and research community (n = 5) also filled in a questionnaire anonymously.

In order to complement qualitative expert interviews with quantitative data, official statistics and own usage measurements were analyzed in autumn 2005 (during no-bundling) and autumn 2006 (during bundling). Usage measurements were conducted at consumer handsets (i.e. handset application/feature usage logs), mobile network elements (i.e. TCP/IP traffic), and operators’ charging and billing systems (i.e. tailored reports) as described in detail by (Kivi, 2006; Hämmäinen, Kivi, & Verkasalo, 2006).

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Table 1: Classification of handset bundling

<table>
<thead>
<tr>
<th>Handset type</th>
<th>Vendor handset</th>
<th>Co-branded handset</th>
<th>Operator handset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brand visibility on handsets</td>
<td>Only handset manufacturer’s logo on the device</td>
<td>Both operator’s and manufacturer’s logo on the device</td>
<td>Only operator’s logo on the device</td>
</tr>
<tr>
<td>Type of handset bundling</td>
<td>No bundling</td>
<td>Mixed bundling or pure bundling</td>
<td>Pure bundling</td>
</tr>
<tr>
<td>Handset market</td>
<td>Manufacturer driven horizontal market</td>
<td>Varies (based on market and negotiation powers)</td>
<td>Operator driven vertical market</td>
</tr>
<tr>
<td>Handset sales channel</td>
<td>Subscriber buys the handset from retailer</td>
<td>Varies</td>
<td>Operator buys the handset from handset manufacturer</td>
</tr>
<tr>
<td>Hardware customization</td>
<td>Standard handset models only</td>
<td>Varies</td>
<td>Exclusive operator-specific handset models</td>
</tr>
<tr>
<td>Software customization</td>
<td>Localized settings and user interface on standard platform</td>
<td>Varies</td>
<td>Exclusive service settings, applications, and user</td>
</tr>
<tr>
<td>Ease of taking operator specific services in use</td>
<td>More difficult</td>
<td>Varies</td>
<td>interface on standard platform</td>
</tr>
<tr>
<td>Level of operator control on the market</td>
<td>Low</td>
<td>Varies</td>
<td>High</td>
</tr>
<tr>
<td>Example</td>
<td>Handsets in Finland</td>
<td>Handsets of Vodafone in the UK</td>
<td>Handsets of NTT DoCoMo in Japan</td>
</tr>
</tbody>
</table>

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LEAD (Optimal Rules for a Leading Mobile Data Market) was a 2-year national project (2004–2005) funded mainly by the National Technology Agency. The justification for the project was to support the renewal of the Finnish telecommunications cluster by improving the understanding of market dynamics in the mobile data business. The objectives were to identify and understand the key obstacles and potentials of co-operation and regulation for Finland to become a leading mobile data market. Non-academic partners in the project were TeliaSonera, Elisa, DNA, Nokia, and Finnish Communications Regulatory Authority.

In addition to the three licensed mobile operators, Finland had an active mobile virtual network operator market, see Kiiski and Hämmäinen (2004).

LEAD seminar was held for directors and experts, altogether 40 participants, of the sponsoring companies and organisations in LEAD. The topic for LEAD Seminar was “Finland—A Leading Mobile Market?”
4. Research environment

Finland was a leading mobile market in the 1990s as measured by early roll-out and subscriber penetration of early mobile services. For instance, the Finnish Radiolinja launched GSM services in 1991 as the first operator in the world. This leading position was gradually taken by other markets such as Japan and South Korea in the late 1990s. The lagging of Finland behind other leading markets is demonstrated by the fact that the leading Finnish mobile operator TeliaSonera launched 3G services as late as in 2004 as the 50th operator in the world. Since a leading edge home market strengthens the R&D of exporting firms, the Finnish stakeholders are looking for diagnoses and improvements to the market slowdown in Finland. Root causes could be found for instance in the peculiarities of the Finnish market, including a low-density population, a small market share of pre-paid subscriptions, a high penetration of traditional GSM services, a zero-priced number portability, high market shares of both the leading operator and handset manufacturer, and a law prohibiting handset bundling (Kiiski & Hämmäinen, 2004). The combination of these features turned Finland into a high churn market with intense competition during 2003–2005 (Björkroth, 2005). Further, this general market dynamics also slowed down the renewal of handsets, resulting in a slightly old-fashioned installed base of handsets compared with other European countries (see Table 2).

A law has prohibited handset bundling since 1997 and the national Communications Market Act of 2003 confirmed that the price of a handset, or a related accessory, should not depend on whether the buyer also acquires a subscription. Thus, mobile handsets were sold to consumers as vendor handsets. As a side effect the Finnish mobile operators kept attracting subscribers by offering add-ons such as digital cameras, backpacks, and DVD players, which represented a significant revenue shift from the mobile industry to other industries. In June 2005, the Finnish Ministry of Transport and Communications (MINTC), the Finnish regulator, decided to promote the adoption of new technologies by proposing to allow handset bundling and subsidy for non-GSM handsets, which in practice means 3G/WCDMA handsets. Details of the new ruling include a maximum contract period of 24 months, zero-cost SIM lock removal after the contract period, and request for offering the same services also without bundled handsets (i.e. mixed bundling). The Finnish parliament approved this ruling as a temporary 3-year modification to the Communications Market Act effective from April 2006.

The questionnaire results from the LEAD seminar held before the change of law are summarized in Table 2. A majority (63%) of all respondents were in favor of allowing handset bundling for all types of handsets. A majority (66%) also considered a dedicated 3G handset bundling as a useful regulatory action for speeding up the handset base development.

<table>
<thead>
<tr>
<th>Agree (%)</th>
<th>Disagree (%)</th>
<th>No comments (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bundling should be allowed in Finland</td>
<td>63</td>
<td>4</td>
</tr>
<tr>
<td>If bundling is allowed, it should be allowed for all handsets</td>
<td>55</td>
<td>19</td>
</tr>
<tr>
<td>If bundling is allowed, it should be a permanent decision</td>
<td>38</td>
<td>25</td>
</tr>
<tr>
<td>If bundling is allowed, also SIM-lock should be allowed</td>
<td>45</td>
<td>18</td>
</tr>
<tr>
<td>South Korea is a good example of bundling regulation for Finland</td>
<td>15</td>
<td>19</td>
</tr>
<tr>
<td>Japan is a good example of bundling regulation for Finland</td>
<td>15</td>
<td>11</td>
</tr>
<tr>
<td>The handset base of Finland is poor compared to the best European markets</td>
<td>70</td>
<td>15</td>
</tr>
<tr>
<td>The development of handset base should be speeded up with regulatory actions</td>
<td>37</td>
<td>3</td>
</tr>
<tr>
<td>Allowing a dedicated 3G handset bundling is a useful regulatory action for speeding up the handset base development</td>
<td>66</td>
<td>4</td>
</tr>
</tbody>
</table>

9It should be noted that the Finnish arm of TeliaSonera, former Sonera, lost a significant part of its investment capability due to heavy losses in German 3G licenses. This issue certainly is a significant explanation for the late start of WCDMA in Finland.

10Note that the regulator persons chose not to answer to the directly regulatory questions of the questionnaire due to their formal impartial role (“No comments”).
old-fashioned. A political bias is visible in the results with respect to using regulatory actions to speed up the development of the handset base, since the operator representatives support it (67% agree, 22% disagree) but the mobile equipment industry representatives oppose it (100% disagree).

5. Results

The handset bundling framework depicted in Fig. 1 shows the impacts of handset bundling regulation on the usage of data services in the rapid transition from no-bundling to bundling in Finland. The framework ignores non-usage consequences of handset bundling regulation as well as non-bundling factors affecting service usage. Next, the regulator’s steering options (listed 0–5) and the related market impact factors (listed A–K) are discussed with the supportive empirical and theoretical observations. Abbreviations are used to identify the origin of interview comments, either mobile operator (MO) or handset manufacturer (HM) representatives, and the time of empirical observations, either before (PRE) or after (POST) the regulatory transition from no-bundling to bundling.

5.1. Steering option 0: handset bundling permission

A regulator may allow pure or mixed handset bundling. In Finland, the regulator imposed mixed bundling to secure the availability of the bundled service components (ref. steering options 1–4) also for the unbundled service contracts (ref. steering option 5). When the law allowed bundling on April 2006, all mobile operators started marketing heavily on bundled 3G contracts and minimized the marketing of unbundled contracts. This indicates operators’ general interest for bundling as observed also in other markets.
5.2. Steering option 1: subsidy size

A regulator may set general or technology specific caps for handset subsidies. The Finnish regulator allowed an uncapped subsidy but only for non-GSM, i.e. sophisticated 3G handsets. Operators started cautiously but competition rapidly brought the subsidies close to 100%. In the short-term, due to the recent high churn period in Finland, operators considered handset subsidies mainly as a price to be paid for the long contracts that reduce churn (PRE). The regulator considered subsidies as a tool for speeding up the renewal of handset base. The high subsidy focused on 3G handsets is efficiently improving the 3G penetration since the bundled 3G subscriptions represent 35% of all subscriptions sold in 3Q2006 (Ficora, 2006). As a side-effect of the heavy marketing of 3G bundles, the number of unbundled 3G handsets is also growing faster. Consequently, the 3G handset penetration has increased from less than 1% in the end of 2005 (PRE) to 10% by the end of 2006 (POST) (Kivi, 2007b). Achieving this rapid 3G handset adoption without high subsidies would have been difficult. However, this positive transition impact can be lost in the longer-term because the chosen 24-month contract period seems long: “Subsidies may increase or decrease the speed of handset renewal depending on the length of contracts. The current handset holding time in Finland is less than 24 months” (POST/HM). These observations suggest that subsidies lead to a higher penetration of sophisticated handsets if the regulator keeps the contract periods short enough and steers subsidies to sophisticated handsets. Thus, the shorter the contract period and the higher the subsidy percentage, the faster is the adoption of sophisticated handsets (impact 1 → A). This strategy was tested also in South Korea (Kim, 2005).

5.3. Steering option 2: handset technology

A regulator may direct the bundling impact by limiting subsidies according to technology criteria such as radio standards or display sizes. This causes additional regulatory monitoring costs, but seems necessary when aiming at the promotion of a new technology. “Competition may direct subsidies to low-end models. Operators may ignore high-end handset models including new features that do not generate service revenue” (PRE/HM). The Finnish regulator decided to avoid the risk and limited bundling only for non-GSM handsets (impact 2 → A). The technology focus defined by the regulator also significantly reduces the possible set of bundled handset models (impact 2 → B).

5.4. Steering option 3: handset customization

A regulator may not give detailed ex ante guidance with respect to product vs. price bundling. However, the competition and consumer protection authorities ex post handle subscribers’ complaints on usage restrictions set by operators. For instance, in the US a law suit due to restriction of consumer choice was triggered when an operator disabled BlueTooth connectivity. In Finland, this kind of misbehavior has not been an issue so far.

More importantly, Finnish operators use their volume purchase power and product bundling capability to differentiate in services: “Operators differentiate by offering a better integrated and smaller set of bundled handsets” (PRE/MO). Operators’ large handset investments also create a pressure to integrate the selected handset models better to the operator’s own service portfolio. As handsets have become more programmable, operators can use this opportunity for pre- and reconfiguring the settings and applications. In addition to improved service usability, handset customization allows the operator to better use brand visibility for promoting customer lock-in and reducing churn. Consequently, product bundling is more beneficial to operators than mere price bundling. On the other hand, the cost of customization is rather in the network side than handsets: “Handset-side software customization costs only eurocents per handset” (PRE/HM). Further, the network side service costs, capital and operational, increase significantly as the number of different handset models increases. This logic explains why handset customization leads to a relatively smaller number of handset manufacturers and bundled models per operator (impact 3 → B). This reduced offering may

gradually reduce the number of handset models attached to an operator’s network but the operator may also proactively simplify the installed base: “An operator can use the knowledge about subscriber’s current unbundled legacy handset for the focused marketing of a new bundled handset”\textsuperscript{12} (PRE/MO).

5.5. **Steering option 4: bundled contract period**

A regulator can efficiently adjust the lock-in effect of handset bundling by capping the contract period. The Finnish regulator set this cap to 24 months, which is long compared with many other markets. The pressure came from operators: “GSM price competition in Finland focuses on voice and text messaging, not on new packet data services. Long service contracts will reduce the high churn: competition will move from prices to new services” (PRE/MO). In theory this contract-based lock-in leads to higher switching costs that reduce churn and price competition (impact 4→C, Courcoubetis & Weber, 2003). Finland has moved from an extremely high churn, over 40% in first quarter 2005 (PRE), to more normal levels, circa 10% in third quarter 2006 (POST, Numpac, 2006). This churn reduction started due to market consolidation already in 2005 when the incumbent Elisa acquired the virtual operator Saunalahti (PRE). However, the churn has continued declining also in 2006, which gives some empirical support to theory.

Interestingly, handset subsidies without long service contracts were experimented in South Korea in 1999–2000, but abandoned due to serious allocative inefficiencies: the average handset holding time collapsed to 3–4 months, operators’ financial performance deteriorated, and South Korea’s international trade deficit increased (Kim et al., 2004). Consequently, handset subsidies without long service contracts are unlikely.

5.6. **Steering option 5: unbundled contracts**

A regulator may want to promote price competition by securing the availability of unbundled contracts. The Finnish regulator decided that the bundled services must also be available for unbundled subscriptions. The consumer protection authority further requires that operators present the real itemized and total costs as part of advertisements to enable easy comparison of bundled and unbundled subscription prices. However, although the regulator has tried to maintain competition in unbundled subscriptions, the clear decrease of unbundled subscription advertisement indicates reduced competition (impact 5→D). Further evidence comes from the number portability statistics that indicates a reduction of 20% in churn between first quarter 2006 (PRE) and third quarter 2006 (POST, Numpac, 2006).

5.7. **Impact factor A: higher penetration of sophisticated handsets**

Technology evolution produces new handsets with better displays, more processing and memory capacity, and faster communication links. Combined with the latest usability design knowledge and faster radio connectivity this gradually improves the usability of handsets and value-added data services, even without customization. This logic implies that a higher penetration of latest sophisticated handsets, bundled or unbundled, improves the usability of value-added data services provided by operators (impact A→F) and 3rd parties (impact A→E). Note that these impacts are not easily quantified because the improving usability of a service often leads to adding new features with increased complexity.

5.8. **Impact factor B: reduced set of offered bundled handsets**

The diversity of handset models is currently high due to the fast evolving technology. So far no single player, or a group of players, in the global mobile industry is powerful enough for orchestrating the end-to-end usability for a large set of services and handset models. The result is weak usability: “There are already too many operator services since the usage of many services is low. Too many subscribers quit experimentation of a

\textsuperscript{12}Note that operators may use the bundling capability also for getting faster rid of the legacy handset models attached to their network. Roughly 1000 different device models were connected to the Finnish mobile networks in autumn 2005 (PRE) (Kivi, 2006). A reduction of attached handsets enables various operational cost savings.
new data service already in the configuration phase. Lots of unnecessary variation exists in the current user interfaces” (PRE/MO, HM). This leaves a window of opportunity for operators to orchestrate their own limited bundled service and handset portfolio of high usability (impact B→F), which is exploited by operators in Finland: “Operators simplify and unify their end-to-end bundled services” (POST/MO).

5.9. Impact factor C: less competition on bundled service tariffs

“Less competition implies lower churn and higher service tariffs but also lower marketing costs. Operators must be allowed to recover the handset subsidy from subscribers” (PRE/MO). “Tariffs become less understandable to subscribers” (PRE/HM). The tariff increase (impact C→H) can be thought of having two components from the regulatory viewpoint: (1) the acceptable subsidy recovery and (2) the undesirable lock-in benefit. These two are quite challenging to separate. For instance, the smaller churn reduces some large costs such as marketing,13 which creates a potential for tariff decrease assuming that operators would pass some of the benefit to subscribers. In Finland, the tariff increasing impact of bundling is reduced because the competition authority requires that operators itemize the bundled prices in their marketing materials to enable easier price comparison.

5.10. Impact factor D: less competition on unbundled service tariffs

Having less competition on unbundled service tariffs pulls tariff levels upward in theory (impact D→H, see also C). Since Finland already has the lowest consumer tariffs in Europe in traditional voice and messaging services (MINTC, 2006), even an absolute increase would not be surprising. In fact, two biggest mobile operators have announced an initial charge per voice call after the law change, which has increased the overall tariffs. Also the average revenues per user have started increasing after a long period of decrease.

The evolution of packet data services is quite different since the tariffs have continued a clear declining trend before and after the law change, which poses a conflict with our framework. This can be explained by the early state of packet data market: the handset bundling dynamics is not yet working in this respect because the marketing efforts and usage levels are still relatively low.

5.11. Impact factor E: improved usability of Internet services

The diversity of value-added Internet services presents a usability challenge that cannot be solved rapidly. However, better handsets and faster radio access bring a partial solution to all value-added services, “the more high-end handsets, the more potential data users” (PRE/MO, HM), which statistically increases data usage (impact E→I).

In Finland, this impact works efficiently among smart phone using early-adopter consumers who accessed predominantly (about 68% of all browsing traffic) Internet destinations instead of operator portals at the end of both 2005 and 2006 (PRE, Kivi, 2006 and POST, Verkasalo, 2007). On the other hand, packet data traffic volume by consumer subscribers was clearly smaller, albeit growing in 2005–2006, than traffic by business subscribers both on the aggregate level and as per subscriber (see K) (Kivi, 2007b).

5.12. Impact factor F: improved usability of bundled operator services

Improving the usability of operator's value-added data services with bundled 3G handsets should increase mobile data usage (impact F→I). However, this impact has not been strong in Finland since 90% of all packet data traffic in the mobile networks went through Internet access points, thus by-passing operator portals at the end of both 2005 and 2006 (PRE and POST, Kivi, 2007a). On the other hand, the usage of operator-specific client applications was found to be increasing in two early adopter handset-monitoring panels organized in

13In the Finnish media advertising statistics of 2004, telecom operators (Elisa, TeliaSonera, Saunalahti, DNA Finland) took four out of the five leading positions. In addition, the advertising expenditure of telecom operators was among the fastest growing in Finland (Aikakauslehtien liitto, 2005).
autumn 2005 (PRE) and 2006 (POST, Verkasalo, 2007) Because bundled handsets are rapidly increasing in the consumer segment and expanding from early adopters to mainstream consumers, the impact on the usage of bundled operator services is likely to become stronger.

5.13. Impact factor G: faster build-out of radio coverage

Subscribers get an opportunity to exploit their sophisticated 3G handsets when staying within the 3G coverage area. On the other hand, faster radio connections clearly encourage subscribers to increase data usage (Hämäinen et al., 2006). These observations imply that the faster build-out of 3G coverage increases data usage (impact G → I). In Finland, the biggest towns were already covered with 3G before the law change but the operators started rapidly upgrading their 3G networks for higher data speeds using the high-speed downlink packet access technology.


The general price elasticity theory says that the higher the price, the lower the demand (impact H → J). So far the relative tariff-increasing impact and the corresponding usage-decreasing impact of bundling have not been visible in Finland.

The relatively higher tariffs and new revenue from handset sales gradually improve the financial position of operators. This stronger long-term outlook immediately improves the capability and willingness of operators to invest in new technologies such as 3G, thus speeding up the build-out of radio coverage (impact H → G). Unfortunately, this impact cannot be easily confirmed through statistics although the expanding 3G coverage maps have become a visible part of operators’ 3G bundling advertisements.

5.15. (I and J) more/less usage of mobile data services

Combining the usage increasing (impact I → K) and decreasing (impact J → K) factors of the framework produces the net impact on mobile data usage.

5.16. Impact factor K: net impact on mobile data usage

The growth of cellular mobile data traffic in Finland was 200% from third quarter 2005 (PRE) to third quarter 2006 (POST) and 78% from second quarter 2006 to third quarter 2006 (Ficora, 2006). As about 70% of Internet-bound mobile network packet data traffic was based on Windows laptops at the end of both 2005 (PRE) and 2006 (POST), the key driver of overall traffic growth seems to have been adoption of 3G by business subscribers using laptops (Kivi, 2007a, 2007b). The growth figures are smaller compared with Sweden, 350% growth from first half 2005 to first half 2006 (PTS, 2006), which might be due to the larger 3G coverage in Sweden. Thus, the growth impact of consumer segment and handset bundling in Finland was partly hidden by the laptop traffic.

Taking into account the main observations of the framework—the bundling-driven increase of 3G handset penetration and the positive usage impact of faster 3G connections—it seems evident that handset bundling enabled a rapid exploitation of cumulated 3G potential in Finland during 2006. The possible negative usage impact of bundling, the relative tariff increase, did not materialize probably because the regulator required the operators to provide the bundled services also as unbundled and to itemize the price of handset and service in advertisements. The outcome of the framework is in line with the interviewees’ prediction in 2005 that fixing the old-fashioned handset base will fix the problems in mobile data service adoption in Finland.

6. Discussion

The framework was inspired by the assumption that regulators can use handset bundling to speed up the adoption of new services. This assumption turned out to work in the unique situation of the bundling law transition in Finland when the handset base was old-fashioned and a single critical growth technology, 3G,
was in a key role. Although, the negative usage impacts of handset bundling can be reduced by shortening the maximum contract period and preserving the requirement of mixed bundling, similar positive impacts may not be easy to achieve in the future. Handset technology gets more advanced and diverse, which makes the regulatory definition of advanced target technologies a moving target. Regulated bundling may also cause high legal monitoring and dispute costs to authorities as recognized by Kim et al. (2004). Some new functions, such as multi-access and multi-operator use cases (Rinta-Aho, 2006), may challenge the concept of bundling a handset with services of a single operator. When observing that the law change in Finland made the handset value chain operator-driven, effectively disassembling the traditional unbundled value chain, it might be difficult to stop bundling and return back to the unbundled market mode.

From the mobile operator viewpoint, bundling improves the operators’ differentiation opportunity and moves the market from price to service competition. This and the reduced churn due to longer contracts are likely to increase the operators’ profit margins. Operators also get more control over the handset and its features, which improves the operators’ longer-term position in the mobile market. These benefits, although lucrative compared with costs, are sensitive to the details of the bundling rules defined by a regulator in a given market context.

From the handset manufacturer viewpoint, the power shift towards operators in handset bundling is not desirable. The interests of manufacturers and regulators, however, seem to be aligned in the key objectives such as short contract periods, high-end technology focus, and open Internet innovation. This alignment may work on behalf of handset manufacturers as mobile Internet services take off.

From the subscriber viewpoint, handset bundling is likely to improve the user experience of the whole product until the technology for mobile data services gets widely standardized. As a downside, operators may prioritize handset features according to revenue potential, which may delay the launch of some features desirable to subscribers. For instance, an operator may not want to invest in a WLAN or BlueTooth feature in handsets if the related service is not in the operator’s portfolio. One solution would be that the regulatory policy maintains balanced competition between bundled and non-bundled handsets.

Regarding the generalization of the handset bundling framework, the distinctive parameters of each mobile market affect rather the quantitative than structural dimensions of the bundling framework. For instance, big operators in big markets are more capable of exploiting the end-to-end service customization opportunity and may achieve a stronger positive usage impact than smaller operators. Correspondingly, pre-paid-driven markets, such as Italy, are less influenced by handset bundling because subsidies are less likely in pre-paid subscriptions, which reduces the strength of all usage impacts in the framework. In fact, the proportion of pre-paid and post-paid subscriptions is one significant factor that the regulator needs to consider when tuning the rules for handset bundling.

In conclusion, handset bundling, if carefully tuned by the regulator, can have a positive impact on the adoption of new services in the context of fast technology evolution. Acknowledging that competition generally promotes innovation, regulators are encouraged to maintain balanced competition between bundled and unbundled handsets, between bundled and unbundled services, and between operator and Internet services.

References


