Mobile services industries

Analysis of industry-specific framework conditions relevant for the development of world-class clusters

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Executive Summary

The current report represents a detailed case study description for the mobile services industries prepared by PwC for Enterprise and Industry Directorate General of the European Commission within the “Extension of the European Cluster Observatory: Promoting better policies to develop world-class clusters in Europe” (contract nr 71/PP/ENT/CIP/11/N04C031).

The European mobile services industries have a great potential for contributing into the goals of Europe 2020 Strategy, the EU’s growth strategy for the coming decade. Mobile services industries have a central role in enabling Europe to become a smart and sustainable economy, which implies achieving high levels of employment and productivity. Despite the economic climate, mobile services industries continue to make a strong socio-economic contribution to Europe. The mobile industry supported an estimated 1.7 million jobs in Europe in 2010 and mobile operators contributed approximately 174 billion EUR (1% of total EEA GDP) to GDP. Contribution to public funding amounted to approximately 65 billion EUR, plus an additional estimated 18 billion EUR as the indirect contribution from related industries. It is therefore crucial to identify and analyse the framework conditions that are key to the competitiveness of mobile services industries in European regions.

The objective of the case study analysis is to demonstrate which framework conditions are favourable for the emergence of mobile services industries in regions, and specifically how policy makers can influence the development of this industry. The analysis aims to maximise policy relevance and produce practical policy recommendations on how to support the development of mobile services industries in Europe.

In order to obtain a realistic picture of the framework conditions relevant for the emergence and development of mobile services industries, the notion of industry’s dynamic nature was put in the centre of the analysis. This notion implies that the role and importance of the relevant framework conditions is likely to change with every new stage of the industry’s life cycle. To be effective, supporting measures thus need to be tailored to the various stages of the life cycle. The current analysis is built along the first four stages of the industry’s life cycle, i.e. stages relevant for emerging industries: (1) Precursor; (2) Embryonic; (3) Nurture; and (4) Growth. Key data sources include extensive desk-research, online questionnaire and validation interviews with industry experts (representatives of ten European hotspots in mobile services industries).

This case study is part of a number of reports prepared in the framework of the extension of the European Cluster Observatory. Two additional case studies also present results for the creative industries and the eco industries. The methodology for the case studies is described in more detail in a separate methodology report on the identification and benchmarking of ideal framework conditions. The definitions of emerging industries are detailed in the methodology report for the classification of the most active, significant and relevant new emerging industrial sectors. Emerging industries can be defined as the establishment of an entirely new industrial value chain, or the radical reconfiguration of an existing one, driven by a disruptive idea (or convergence of ideas), leading to turning these ideas/opportunities into new products/services with higher added value. The European Cluster Excellence Scoreboard Pilot Version measures regional strength in emerging industries and presents results in the fields of creative industries, eco industries and mobile services. The methodology applied by this scoreboard is described in more detail in a separate methodology report. Furthermore, a policy roadmap prepared by the European Forum for Clusters in Emerging Industries (EFCEI) introduces recommendations for actions for new linkages to promote the development of emerging industries through clusters in Europe. All reports – together with further maps by country, industry and indicators – can be found at http://www.clusterobservatory.eu/index.html!view=aboutobservatory;url=/about-observatory/emerging-industries/ and http://www.emergingindustries.eu/.

1 http://ec.europa.eu/europe2020/index_en.htm
The analysis confirmed that the role and importance of the relevant framework conditions changes with new stages of the industry’s life cycle. However, all identified framework conditions prove to have a long-term impact and are relevant for more than one stage. Figure 0-1 presents the result of the mapping exercise of the analysed framework conditions for mobile services industries.

**FIGURE 0-1: Mapping of identified framework conditions for mobile services industries**

Key policy recommendations per industry development stage are as follows.

*Policy recommendations for Precursor stage*

Policy makers can stimulate the development of mobile services industries at the Precursor stage in the following ways:

1) **Existing prominent ICT (equipment) industry:**
   a) Prominent ICT (equipment) industry is more likely to settle in a region that is more attractive to them. Policy makers can aim to increase the attractiveness of the region for this type of industry.
   b) There are various ways in which policy makers can help raise the attractiveness of the region, which include stimulating and ensuring presence of skilled labour, (venture) capital, high quality educational and research institutions, and high levels of R&D investments in the region.
   c) Policy makers may give (prominent) ICT companies an incentive to settle in the region by offering government funding, e.g. grants or subsidies, to new entrants.
2) **Multi-operator market structure:**
   a) If there is no multi-operator market structure in place, policy makers need to create such a market structure. Both de-monopolisation of the market and unbundling of industries are relevant policy instruments, as well as privatisation of State Owned Enterprises (SOEs).
   b) If a multi-operator market structure is already in place, policy makers need to sustain this type of market structure. By putting a regulator in place that oversees competition on the market as well as takes the desired market structure into account, a multi-operator market can be sustained. For example, a National Competition Authority may be empowered to assess mergers and acquisitions, ensuring that the local market is exposed to ample competitive pressure.

3) **Critical mass of consumers with demand for high end devices with wide application areas:**
   a) Policy makers can stimulate the creation of a critical mass of consumers by stimulating the demand for high end mobile devices.
   b) Examples of measures stimulating the demand include (pre-commercial) public procurement and making services available for high end mobile devices, such as providing citizens a mobile portal for various public services.

4) **Critical mass of Science and Technology Researchers:**
   a) Regional stakeholders need to highlight the attractiveness of the region in order to attract highly skilled researchers. They should also create awareness for both the region as a place to live and as an innovative hotspot.
   b) Policy makers should promote education and careers in the ICT and mobile services industries in the region.
   c) Graduates need to be stimulated to take up research positions in the field of Science and Technology. By actively promoting and stimulating education and careers in these industries, more highly skilled human capital becomes available over time.
   d) It is crucial for policy makers to understand that critical career decisions are being made already more than a decade before a student enters the workforce. Policy makers should therefore promote education and careers in high tech fields already at the pre-vocational and vocational level.
   e) There is also a need to offer children early technical education programmes that broaden their choice and development opportunities. These programmes need to motivate children to want to learn more, transmit the excitement of science investigation and engineering innovation, and provide teachers with the appropriate tools to facilitate the learning process.

5) **Mobile market liberalisation:**
   a) Policy makers should stimulate a multi-operator market structure in the region.
   b) By deregulating the mobile services market, other firms can enter the market. This is specifically possible if market entry and expansion faces limited regulation, and if existing market actors face limited to no protection from the authorities.
   c) In order to facilitate a multi-operator market structure, policy makers can de-monopolise existing telecommunications industries, unbundle vertically integrated actors on the markets and liberalise competitive segments.
   d) An independent regulator should be introduced for making the transition from monopoly to market and to ensure a level playing field for market participants.

6) **Investments in next generation technology and networks:**
   a) Policy makers should provide incentives to private companies to invest in next generation technologies and networks, e.g. by providing subsidies, giving out preferential loans or by guaranteeing loans.
   b) Policy makers should provide direct government investments, e.g. to stimulate internet penetration within the region or by directly investing in next generation data networks.
**Policy recommendations for Embryonic stage**

Policy makers can stimulate the development of mobile services industries at the Embryonic stage by ensuring:

1) **Availability of seed and venture capital for mobile services companies:**
   a) By providing targeted and increased support to the industry from EU Community Budget, the European Investment Fund and European Investment Bank, private investments could be triggered.
   b) This support from EU government bodies can take the form of providing a package of financial instruments to cover different company sizes and structures (e.g., loans, guarantees, grants and tax incentives) aimed at increasing the attractiveness for the private sector to invest in European mobile service industry product development activities.

2) **Policy measures promoting entrepreneurship in mobile services industries:**
   a) Policy makers should stimulate public-private partnerships focused on innovation, specifically in the field of telecommunications and mobile services. Public-private partnerships in mobile technology and mobile services are more likely to result in new solutions, characterising the emerging mobile services industries.
   b) Policy makers should provide government-backed vouchers for innovation support. These vouchers can positively influence the entrepreneurial climate in a cluster.
   c) Moreover, policy makers need to stimulate the creation of service innovation and promotion platforms. These platforms both stimulate service innovation and bring attention to the new mobile services industries.
   d) Policy makers need to stimulate the creation of Working Groups to discuss goals, ambitions and future policy actions for the ICT and mobile services industries. Research and discussions resulting from these Working Groups can be used to formulate ambitions, policy goals and establish a roadmap for mobile service innovation.

The abovementioned policy actions are relevant also for the next two stages of industry's development: Nurture and Growth stage.

**Policy recommendations for Nurture stage**

Policy makers can stimulate the development of mobile services industries at the Nurture stage by ensuring/supporting the presence of:

1) **Critical mass of mobile services:**
   a) The key task of policy makers is to create an environment favourable for setting up and expanding businesses in the region.
   b) Policy makers should therefore promote the concept of mobile services industries in the region (e.g., social marketing and advertising campaigns promoting mobile services industries, new mobile technologies and applications in the region, as well as incentivising the purchase of high end mobile devices to allow for new mobile services).
   c) Policy makers also need to promote entrepreneurship in the mobile services industries;
   d) Policy makers should stimulate public-private partnerships. Public-private partnerships boost innovation in the region and advances technological progress.
   e) Policy makers need to simplify access to finance for mobile services companies.
   f) Programmes that support SME growth (financial support; training and coaching) need to be introduced to the region.

2) **Collaboration between regulators and operators:**
   a) Regulators must work together with operators to lower the cost of ownership of the networks, ultimately driving down the costs of mobile phones and mobile services.
b) Policy makers should actively stimulate collaboration between regulators and operators. This can for instance be facilitated by setting up joint meetings between operators and regulators to discuss current issues and new regulation.

c) Policy makers need to support platforms and associations that specifically aim to stimulate discussion between operators and regulators.

3) **Policy measures supporting internationalisation in mobile services industries:**
   a) To stimulate internationalisation of local incumbents, regional and national policy makers can employ “National Champion”-policies. As these champions face low risk on the domestic market, they have an incentive to expand aggressively on international markets.

   b) For the mobile services industries raising awareness, supporting the financial needs of internationalisation, supporting the internationalisation of services and stimulating cross-border cooperation have been of high importance. Policy makers, therefore, should pay close attention to these areas and introduce supporting policies.

   c) Regional, national and EU authorities should stimulate cross-border collaboration by setting up European wide projects with a common goal. Such cross-border collaboration helps domestic firms to gain access to international markets.

4) **Presence of a platform to promote service innovation in the area:**
   a) Policy makers should support the creation of innovation platforms that aim to accelerate service innovation in the mobile services industries. European wide innovation platforms are more likely to stimulate cross-border collaboration and knowledge transfer, which may create additional benefits.

   b) Policy makers are recommended to take into account that it is often advantageous to build on successful initiatives. They should therefore stimulate linkages between newly created and existing service innovation platforms. A number of European service innovation platforms specifically in the field of mobile services are already in place (e.g. EMMA and MOBIP) and need to be taken into account.

5) **Dedicated cluster organisation:**
   a) Regional, national and EU authorities need to offer dedicated cluster policies that typically include grants for cluster management activities and specific collaboration projects.

   b) The level of bureaucracy related to application and implementation of cluster policies in the region needs to be minimised (i.e., complicated management procedures; long approval procedures for projects and excessive administrative workload need to be removed).

   c) Since mobile services industry clusters represent highly complex systems with multiple stakeholders from multiple related industries involved, cluster policy measures should not be applied on a solely basis. It is rather a combination of various complementary measures that need to be applied simultaneously (e.g., education & skills, logistics & infrastructure etc.).

   d) At the EU level, in close cooperation with national governments and regions, there is a need to support the efforts of cluster organisations to improve their performance and reach excellence (e.g., European Cluster Excellence Initiative and the organisation of further “train-the-trainers” activities for cluster managers).

The abovementioned policy actions are relevant also for the Growth stage.

*Policy recommendations for Growth stage*

Finally, besides the measures already mentioned above, policy makers can stimulate the development of mobile services industries at the Growth stage in the following way:

1) **Vertical integration of cluster actors:**
   a) Policy makers therefore need to carefully assess cases of vertical integration on a case-by-case basis to prevent detrimental effects on welfare and innovation, even though evidence for the harmful effects of vertical integration is suggested to be weak.
b) Policy makers should actively put the benefits of vertical integration in the growth stage up for discussion. They can set up meetings with key stakeholders in the industry and engage in public consultation with industry.

c) Policy makers may help bring industry players closer together to stimulate vertical integration, e.g. by funding collaborative projects or by stimulating active participation in mobile services clusters.

d) Policy makers from the region can engage in discussions with other regions to share their experiences with vertical integration in the domestic market. Moreover, at a European level, discussion on related aspects, such as “net-neutrality”, can raise awareness for the benefits of particular vertical integration cases.

2) Exploitation of new distribution channels:
   a) Regional, national and EU authorities can raise awareness of new business opportunities, not only within the regions but also outside the regions.
   b) Regulators need to ensure existence of competitive pressure on the market that is likely to spur in service innovation.
   c) Policy makers should support and promote new (digital) distribution channels, e.g. by ensuring safe access for users, safe mobile payments and exerting confidence in these new distribution channels.

3) Agreements on interface standards:
   a) Regional, national and EU authorities need to be aggressive in setting interface standards. European countries, compared to the U.S., have been slightly faster to set standards and aggressive time-tables for e.g. the changeover from analogue to digital broadcasting. This also led to earlier industry formation in Europe. Europe needs to continue this trend to gain a competitive advantage.

4) Collaboration and strategic alignment between network operators and mobile device dealers:
   a) Policy makers should stimulate discussions between the different stakeholders groups by e.g. setting up meetings between operators and dealers.
   b) Policy makers, at the regional, national and EU level, should stimulate strategic alignment by funding projects of common interest, in which the various groups of stakeholders participate.
   c) Policy makers should promote an agreement on standards in which both stakeholder groups have a strategic interest. This would further stimulate a strategic alliance.
   d) Policy makers need to support cluster initiatives to facilitate further discussions and collaboration between both stakeholder groups.

5) Collaboration between mobile service companies and mobile device manufacturers:
   a) Policy makers should stimulate discussions between the different stakeholders groups by e.g. setting up meetings between mobile services companies and mobile device manufacturers;
   b) Policy makers, at the regional, national and EU level, should stimulate strategic alignment by funding projects of common interest, in which the various groups of stakeholders participate. Projects that require both service innovation and technical innovation can lead to new mobile services, spurring growth in the mobile services industries;
   c) Policy makers should promote an agreement on standards in which both stakeholder groups have a strategic interest. This would further stimulate a strategic alliance.
   d) Policy makers need to support cluster initiatives to facilitate further discussions and collaboration between both stakeholder groups.

Concluding remarks

1) While favourable policy measures cannot solve all the challenges on their own, their presence can significantly accelerate the development of mobile services industry clusters.

2) There is no generic ‘silver bullet’ across all mobile services industry clusters in terms of policy measures that have to be applied. What works in one region does not necessarily have to work in another one, as
myriads of contextual factors (including historical, economic, demographic, cultural and other developments) determine the success of the applied policy measures.

3) The critical task is to ensure that policy interventions first support an effective process of identifying the action priorities and then provide the right tools to address whatever those priorities are.

4) Policy interventions supporting industry development should always be discussed with local companies, and designed in a way that captures the interest of those companies. Consequently, industry’s involvement in policy making is crucial from the very early stages, including the design stage of a policy intervention (joint objective setting), but also its monitoring and evaluation.
1. **Objectives, scope and methodology**

The current chapter summarises the objectives, scope and methodology of the case study analysis. The purpose of the chapter is to familiarise the reader with the applied approach and the rationale behind it. In the end of the chapter, we also elaborate on the structure of the current report.

### 1.1. **Rationale and objectives of the case study analysis**

The current report represents a detailed case study description for mobile services industries prepared by PwC for Enterprise and Industry Directorate General of the European Commission within the “Extension of the European Cluster Observatory: Promoting better policies to develop world-class clusters in Europe” (contract nr 71/PP/ENT/CIP/11/N04C031).

**Key objectives of the analysis**

The analysis on industry specific framework conditions for the development of world-class clusters in mobile services industries implies the development of a suitable, feasible and robust methodology for the identification and analysis of these conditions that are considered to be conductive to the development of world-class clusters in emerging industries. The methodology then needs to be applied to a selection of European regions in three emerging industries: creative, mobile services and eco industries. This exercise among others is expected to lead to detailed case study descriptions demonstrating how emerging industries come to and evolve in regions, and specifically how policy makers can influence the development of these industries. The case study analysis therefore aims to maximise policy relevance and produce evidence-based policy recommendations on how to support the development of specific emerging industries in European regions.

**Strategic importance of mobile services industries for Europe**

The European mobile services industries have a great potential for contributing into the goals of Europe 2020 Strategy, the EU’s growth strategy for the coming decade. Mobile services industries have a central role in enabling Europe to become a smart and sustainable economy, which implies achieving high levels of employment and productivity. This is especially true as the emerging mobile services industries integrate both traditional ICT and telecom companies, as well as innovative service providers.

In the global landscape, the mobile services industries significantly contribute to economic growth. In China alone, the mobile industry generated 5% of the domestic GDP in 2005. The interesting fact, however, is that only a quarter of that is the direct contribution of the mobile industry; the remaining 75% came from related industries, underlining the interlinkages with other industries and the potential for growth.

For Europe, mobile services industries also play an important role. Despite the economic climate, mobile services continue to make a strong socio-economic contribution to Europe. The mobile industry supported an estimated 1.7 million jobs in Europe in 2010 and mobile operators contributed approximately 174 billion EUR (1% of total EEA GDP) to GDP. Contribution to public funding amounted to approximately 65 billion EUR, plus an additional estimated 18 billion EUR as the indirect contribution from related industries.

A number of studies have also established a link between mobile penetration and economic growth. Mobile phones have significantly impacted society through improved communication, social inclusion, economic

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3 [http://ec.europa.eu/europe2020/index_en.htm](http://ec.europa.eu/europe2020/index_en.htm)
activity and productivity in sectors such as agriculture, health, education and finance. Moreover, as the underlying technology further develops, mobile services have the potential to further impact economic growth. Examples include the shift from 3G to 4G networks, which can enable broadband internet access in rural areas, and the increasing number of applications that are made possible on mobile devices, such as smartphones and tablets.

To get a grasp of the economic impact of the mobile services industries, consider the following. Recent research has suggested that:

- for a given level of total mobile penetration, a 10% substitution from 2G to 3G penetration increased GDP per capita growth by approximately 0.15%;
- a doubling of mobile data use leads to an increase in the GDP per capita growth rate of approximately 0.5%;
- in case of developing markets, a 10% increase in mobile penetration increases Total Factor Productivity in the long run by approximately 4.2%.

It is therefore crucial to identify and analyse the framework conditions that are key to the competitiveness of mobile services industries in European regions.

**The role of policy makers in supporting mobile services industries**

Existing research suggests that *policies and regulations have a tremendous influence on the development of the mobile services industries*. Regulatory authorities and policy makers are suggested to have a significant large influence on the investment profile and long-term development of the mobile industry. Investment in future technologies, both from operators and regulatory stakeholders such as the European Union, are considered to be vital for future economic growth. Furthermore, it is suggested in the literature that government policy directly influences the effectiveness of ICT investment and its productivity benefits. As the ICT industries are highly interlinked with the mobile services industries, policy makers need to consider these as well. Therefore, adequate industrial policy initiatives for mobile services industries require a careful analysis of the relevant framework conditions and the identification of potential obstacles that have a negative influence on the industry’s competitiveness.

### 1.2. Definition and scope

In this sub-section, we address the definition and scope of the mobile services industries.

#### 1.2.1. Employed definition of mobile services industries

Mobile services industries comprise companies whose activities enable the provision of telecommunication, information, and entertainment services, including voice, internet, SMS, text, and other data services. The mobile services industries specifically include conversation services (mobile voice and person-to-person messaging), data access services (GSM, GRPS, CDMA, EDGE, UMTS, WLAN/Wi-Fi and other methods), and content services (SMS-based, MMS-based, browser-based, downloadable applications and others), targeting both consumers (messaging services, transaction-based services, news/information services, entertainment services, mobile marketing services, consumer portal offers) and corporations (messaging services, Wi-Fi

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5 Deloitte, (2012). "What is the impact of mobile telephony on economic growth?", report for the GSMA.
6 Ibid.
wireless access services, mobile office solutions, task-based applications, sector-based applications, corporate and professional portals).

For our understanding of the emerging mobile services industries, it is important to consider that **our definition of mobile services industries encompasses two types of industries**: a more traditional telecommunication industry, for which the provision of conversation and data services is its core business, and the rapidly growing mobile content industry, which enables content services. Due to the ubiquity of mobile phones, the rapid development of other connected mobile devices (tablets, e-books, etc.) and the growing mobile content, mobile services industries constitute one of the fastest growing economic sectors worldwide⁹.

1.2.2. **Scope of mobile services industries**

Both core and connected mobile services industries have spread over many sub-categories, of which many are related to the ICT industry. These categories are listed in Table 1-1. The connected mobile services industries are highlighted in Italic.

**TABLE 1-1: Scoping of mobile services industries (based on the outputs of WP3)**

<table>
<thead>
<tr>
<th>NACE code</th>
<th>Level 4 NACE description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2221</td>
<td>Manufacture of plastic plates, sheets, tubes and profiles</td>
</tr>
<tr>
<td>2222</td>
<td>Manufacture of plastic packing goods</td>
</tr>
<tr>
<td>2223</td>
<td>Manufacture of builders/-E ware of plastic</td>
</tr>
<tr>
<td>2229</td>
<td>Manufacture of other plastic products</td>
</tr>
<tr>
<td>2611</td>
<td>Manufacture of electronic components</td>
</tr>
<tr>
<td>2630</td>
<td>Manufacture of communication equipment</td>
</tr>
<tr>
<td>2651</td>
<td>Manufacture of instruments and appliances for measuring, testing and navigation</td>
</tr>
<tr>
<td>3900</td>
<td>Remediation activities and other waste management services</td>
</tr>
<tr>
<td>4120</td>
<td>Construction of residential and non-residential buildings</td>
</tr>
<tr>
<td>4321</td>
<td>Electrical installation</td>
</tr>
<tr>
<td>4651</td>
<td>Wholesale of computers, computer peripheral equipment and software</td>
</tr>
<tr>
<td>4690</td>
<td>Non-specialised wholesale trade</td>
</tr>
<tr>
<td>4754</td>
<td>Retail sale of electrical household appliances in specialised stores</td>
</tr>
<tr>
<td>4778</td>
<td>Other retail sale of new goods in specialised stores</td>
</tr>
<tr>
<td>4779</td>
<td>Retail sale of second-hand goods in stores</td>
</tr>
<tr>
<td>4791</td>
<td>Retail sale via mail order houses or via Internet</td>
</tr>
<tr>
<td>5819</td>
<td>Other publishing activities</td>
</tr>
<tr>
<td>5829</td>
<td>Other software publishing</td>
</tr>
<tr>
<td>5914</td>
<td>Motion picture projection activities</td>
</tr>
<tr>
<td>6020</td>
<td>Television programming and broadcasting activities</td>
</tr>
<tr>
<td>6120</td>
<td>Wireless telecommunications activities</td>
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<tr>
<td>6130</td>
<td>Satellite telecommunications activities</td>
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<tr>
<td>6190</td>
<td>Other telecommunications activities</td>
</tr>
<tr>
<td>6201</td>
<td>Computer programming activities</td>
</tr>
<tr>
<td>6202</td>
<td>Computer consultancy activities</td>
</tr>
<tr>
<td>6203</td>
<td>Computer facilities management activities</td>
</tr>
<tr>
<td>6209</td>
<td>Other information technology and computer service activities</td>
</tr>
<tr>
<td>6312</td>
<td>Web portals</td>
</tr>
<tr>
<td>6499</td>
<td>Other financial service activities, except insurance and pension funding n.e.c.</td>
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<td>7022</td>
<td>Business and other management consultancy activities</td>
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<tr>
<td>7219</td>
<td>Other research and experimental development on natural sciences and engineering</td>
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<td>Advertising agencies</td>
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<td>Market research and public opinion polling</td>
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<td>9200</td>
<td>Gambling and betting activities</td>
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</table>

1.3. Methodology

In the current sub-section, we highlight the key aspects of the methodology. For a detailed description of the methodology, the reader is advised to consult the Methodology Report of the analysis on industry specific framework condition for the development of world-class clusters in mobile services industries\(^{10}\).

**Analytical framework**

When studying emerging industries, their *dynamic nature* should not be ignored. The dynamic nature here refers to a continuous evolution of an industry and its periodical transitions from one stage to another. Therefore, in order to obtain a realistic picture of the framework conditions relevant for the emergence and development of the industries in question, the notion of their dynamic nature should be put in the centre of the analysis, since the role and importance of the relevant framework conditions is likely to change with every new stage of the industry’s life cycle. To be effective, supporting measures thus need to be tailored to the various stages of the life cycle. Furthermore, policies that aim to foster the development of clusters in emerging industries should differ from policies that aim to strengthen clusters in mature industries.

Figure 1-2 presents the employed analytical framework for characterising different stages of the development of emerging industries. The framework illustrates the growth/decline of an industry while it goes through the six main stages of its life cycle ((1) precursor, (2) embryonic; (3) nurture; (4) growth; (5) mature; and (6) decline/renewal), including three transition periods (Science -> Technology; Technology -> Application, and Application -> Market). The framework was adapted from Phaal et al. (2011) because of its comprehensive structure and high relevance to the scope of the current study. As can be seen from the Figure, sometimes an emerging industry’s first stage builds on the last stage of a mature industry.

**FIGURE 1-2: Life cycle of regional industrial emergence**


\(^{10}\) http://www.clusterobservatory.eu/eco/uploaded/pdf/1368193004637.pdf
Below we elaborate on each of the stages and transition periods.

- **Stage 1 Precursor** implies activities that support the development of a certain scientific phenomenon, business concept and/or underpinning service/technology platform in the region, which stimulate industrial interest and investment in particular market-directed feasibility studies.

- **Science - Technology Transition** includes activities that support the demonstration of the feasibility of a scientific phenomenon, business concept and/or underpinning service/technology platform, helping the technology or service to be integrated into an application-oriented system.

- **Stage 2 Embryonic** refers to activities that support the improvement of the reliability and performance of technology and services to a point where it can be demonstrated in a market environment.

- **Technology – Application Transition** implies activities that help to demonstrate the commercial potential of technology and services in the region through revenue generation.

- **Stage 3 Nurture** includes activities that help to improve the price and performance of applications to a point where sustainable business potential can be demonstrated.

- **Application – Market Transition** refers to activities that help to develop a market with mass growth potential.

- **Stage 4 Growth** implies activities that support marketing, commercial and business development leading to sustainable industrial growth in the region.

- **Stage 5 Mature** includes activities that help to refine established applications, production processes and business models.

- **Stage 6 Renewal** refers to activities that help to renew the industry through the development/adoptions of new technologies that repeat the above phases.

For the analysis, the focus has been placed on the first stages and transition periods up to the Maturity stage (Stage 5), since the study aims to analyse the framework conditions helping to foster the development of exclusively emerging industries. Once the maturity stage has been reached, the industry per definition cannot be considered ‘emerging’ anymore, and becomes a mature one, which, in turn, is beyond the scope of the current study.

**Key activities**

Based on extensive desk-research and in-depth interviews with experts and industry representatives, the approach implies developing a pool of relevant industry-specific framework conditions, and assigning them to specific stages and transition periods of the regional industrial emergence.

The abovementioned activities were carried out in several steps:

1. **Step 1: developing a comprehensive overview of the relevant framework conditions from available sources (desk-research):** this sub-task included an in-depth analysis of information on cluster framework conditions from existing sources such as EC publications (including ECO reports), business publications, academic articles and other relevant sources. This sub-task led to an extensive list of relevant industry-specific framework conditions.
(2) **Step 2: compiling and structuring framework conditions:** this sub-task implied the grouping of identified framework conditions into categories based on commonality patterns among those framework conditions thereby creating a nomological net of factors. The commonality patterns here refer to specific stages and transition periods of the life cycle. Furthermore, potential causal relationships between various groups of framework conditions were extracted from the desk-research analysis.

(3) **Step 3: collecting evidence from a selection of European regions:** this sub-task included additional desk-research on the regions in question complemented by an online questionnaire and in-depth interview rounds with the regional representatives of the industry in question. A complete overview of the content of the online questionnaire is provided in Annex A. For each region included in the analysis, a sample of key stakeholders was drawn, with a **helicopter view** on the development of the industry in the region. The helicopter view in this case means understanding the overall picture of the industry’s development in the region rather than having a one-sided perspective. The included groups of stakeholders were: (1) cluster managers; (2) policy makers (regional/national); and (3) industry associations/chamber of commerce or similar. We aimed at developing a list of 5-10 stakeholders per hotspot and then to make a shortlist with 3 key stakeholders to be involved in an in-depth analysis.

(4) **Consolidating the collected evidence and developing detailed case study descriptions:** the final step implied putting all the collected evidence together into one integrated case study description, and, based on the key findings and conclusions, extracting practical policy recommendations.

**Analysed framework conditions**

The results of the first two steps of the analysis are presented in Table 1-2.

**TABLE 1-2: Consolidated overview of the identified framework conditions for mobile services industries**

(1) The acronyms in the table refer to the specific stages of the industry lifecycle: P = Precursor Stage; E = Embryonic Stage; N = Nurture Stage; G = Growth Stage; M = Maturity Stage.

<table>
<thead>
<tr>
<th>Framework conditions</th>
<th>Relevant stages</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Financial framework conditions</strong></td>
<td>P</td>
</tr>
<tr>
<td>1.1. Investments in next generation technology and networks (e.g., Internet penetration; ISDN networks; next generation mobile networks (2G, 3G, 4G))</td>
<td>✔</td>
</tr>
<tr>
<td>1.2. Availability of seed and venture capital for mobile services companies</td>
<td>✔</td>
</tr>
<tr>
<td><strong>2. Industrial framework conditions</strong></td>
<td>P</td>
</tr>
<tr>
<td>2.1. Existing prominent ICT (equipment) industry (ICT equipment manufacturers and distributors have established in the area; these companies make up a significant share of the regional economy)</td>
<td>✔</td>
</tr>
<tr>
<td>2.2. Critical mass of mobile services companies</td>
<td>✔</td>
</tr>
<tr>
<td><strong>3. Market framework conditions</strong></td>
<td>P</td>
</tr>
<tr>
<td>3.1. Multi-operator market structure</td>
<td>✔</td>
</tr>
<tr>
<td>3.2. Critical mass of consumers with demand for high end devices with wide application areas</td>
<td>✔</td>
</tr>
<tr>
<td>3.3. Agreements on interface standards (meetings of stakeholders to agree on interface standards; documents detailing interface standards)</td>
<td>✔</td>
</tr>
<tr>
<td>3.4. Vertical integration of cluster actors (i.e., mergers and acquisitions concerning content providers, packagers, distributors and service providers; mergers and acquisitions concerning business consultants, IT integrators and new media)</td>
<td>✔</td>
</tr>
<tr>
<td>3.5. Exploitation of new distribution channels (e.g., app store)</td>
<td>✔</td>
</tr>
<tr>
<td><strong>4. Cultural framework conditions</strong></td>
<td>P</td>
</tr>
<tr>
<td>4.1. Collaboration between regulators and operators (i.e., regulations that encourage development and market adoption; meetings or joint sessions between regulators and operators)</td>
<td>✔</td>
</tr>
</tbody>
</table>
4.2. Collaboration between mobile service companies and mobile device manufacturers (stakeholder meetings or joint sessions on interoperability of devices and components)

4.3. Collaboration and strategic alignment between network operators and mobile device dealers (e.g., networks that handle assigned mobile traffic without abundant spare capacity; meetings between operators and dealers or joint sessions to increase strategic alignment)

5. Knowledge framework conditions

5.1. Critical mass of Science and Technology Researchers

6. Regulatory and policy framework conditions

6.1. Mobile market liberalisation (i.e., limited regulation on market entry and expansion; limited to no protection for existing market actors)

6.2. Policy measures promoting entrepreneurship in mobile services industries (e.g., funding creative cross-border events; industry-to-industry dialogue; scouting missions; market intelligence; collective representation in international fairs)

6.3. Policy measures supporting internationalisation in mobile services industries (e.g., funding creative cross-border events; industry-to-industry dialogue; scouting missions; market intelligence; collective representation in international fairs)

7. Support framework conditions

7.1. Presence of a platform to promote service innovation in the area (e.g., by means of conferences and seminars on service innovation)

7.2. Dedicated cluster organisation (cluster manager or similar) to coordinate the development of mobile services industries in the region

1.4. Structure of the report

The structure of the report is organised following the dynamic model of industry’s development in the region. Chapter 2 addresses the framework conditions relevant for the Precursor stage. Chapter 3 focuses on the framework conditions important at the Embryonic stage. Chapter 4 elaborates on the framework conditions relevant for the Nurture stage. Finally, Chapter 5 addresses the Growth stage. As shown in the Table 1-2, a framework condition is often relevant for more than one stage of industry’s development. In Chapters 3-6, we elaborate on framework conditions per stage, but to avoid repetition, if one framework condition is relevant for more than one stage, we specify it in the text where this framework condition first appears. In case there are considerable differences with other stages, we mention the same framework condition in the chapters dedicated to those other stages. In Chapter 7, we integrate the analyses of specific stages, draw the key conclusions and formulate policy recommendations. Annex A of the report contains the questions from the online questionnaire relevant for mobile services industries. Annex B provides an overview of the analysed regions and key data on mobile services industries-related clusters in those regions.
2. **Specifics of mobile services industries**

In this chapter, we elaborate on the specifics of mobile services industries, and particularly the key actors of the value chain, key challenges of the industry and the formation of clusters in mobile services industries.

### 2.1. Introduction

This rise of the mobile services industry is fairly recent. It is important here to explain why the mobile services industry is categorised as an emerging industry. In the context of this study, an emerging industry refers to an industry that is most often driven by key enabling technologies, new business models such as innovative service concepts, and by societal challenges that industry must address as a matter of survival. The mobile services industry fits this description. They key enabling technological driver of the industry is the development of wireless data networks, leading to a vast array of new business models such as demonstrated by MSN Text Messaging, Spotify, data roaming payment models, WhatsApp and many more. Furthermore, increasingly more advanced smartphones allow for a whole new paradigm in digital mobile content, including the rapidly growing mobile app and mobile gaming markets.

The mobile services industry is considered to be one of the most dynamic sectors of the European economy. Partial deregulation of national telecommunication markets in the European Community (EC) and privatisation of state-owned telecommunications providers have resulted in a limited number of operators that are active in each of the European countries. National telecommunication markets are as a result characterised by intense competition between a small number of dominant firms. Moreover, additional competitive pressure is caused by governments’ decisions to auction licenses for the use of new frequency ranges, which are essential for rolling out next generation mobile networks. This trend has forced telecommunication providers to heavily invest in order to acquire these licenses. Moreover, to take advantage of the licences, high investments are needed to upgrade the network technologies. This has led to considerable debts, strongly affecting telecommunication stock performance, threatening the survival of some operators, and increasing the pressure on top management to use resources effectively\(^{11}\).

The mobile services industries have changed radically over the past decade. Changing consumption patterns and customer requirements, technological progress that spurred the market for smartphones, and deregulation of markets have opened up new business opportunities. Services are suggested to rapidly become obsolete in this fast-paced market, resulting in increasingly short product life cycles. Due to the increasingly global nature of the mobile industry, ideas spread more rapidly. Industry reports as a result describe a trend of swift imitation or adaptation of successful products. These factors have resulted in hypercompetitive markets, which makes having fast and efficient new service development processes an essential competitive competence for companies in the related industries. Successful companies in the current market therefore need to be highly innovative and dynamic, with a firmly competitive culture\(^ {12}\).

### 2.2. Key actors of the value chain

The mobile services industry value chain comprises a rather broad type of actors. In the literature, the mobile services industry is described to operate as a hub that delivers mobile services to consumers using both hardware and software. Considering the full value chain then, means that all actors are to be taken into account,
from the manufacturing of mobile devices and the provision of mobile infrastructure to the delivery of mobile applications.

Figure 2-1 presents a schematic approach of the mobile services value chain. The figure shows that a set of inputs, in the form of energy and materials, are used in the production of mobile devices and transmission infrastructure. These mobile devices and infrastructure, together with mobile software, in turn provide input to the mobile services industry, which includes service and content providers. They provide the mobile services to consumers, of which the outputs include positive impacts on the economy, health, and society as well as solid waste from the used and disposed hardware devices.¹³

FIGURE 2-1: Value chain of the mobile services industry

Source: Sustainability Assessment of the Mobile Services Industry, by Rudi Anthony, Justin Bean, Jenn Coyle, Giles Hayward, & Kelly James, May 2011

The value chain only tells part of the story, as it does not detail the type of industries and actors that play a role. It is therefore worthwhile to also consider the mobile services ecosystem. The mobile services ecosystem includes a number of key actors. Figure 2-2 summarises the ecosystem in a schematic. A number of actors can be distinguished:

- **Mobile network operators**: these provide the mobile network solutions to mobile users and show interlinkages with device vendors and content providers.

- **Content providers**: these actors develop mobile content, providing input to mobile network operators and retail segments, as well as develop messaging and browsing services, and mobile applications.

- **Device vendors**: they deliver handheld sets to mobile users and provide input to the mobile network operators and retail segments.

- **Mobile users**: the end users of mobile products, services, and infrastructure.

- **Professional services, clusters and associations, and investors**: these actors have an overall influence on the mobile services ecosystem, e.g. through facilitating investments (investors, clusters, professional services) or promoting the industry (clusters, associations).

2.3. **Key challenges of mobile services industries**

The key challenges faced by mobile services industries today include the following:

- **Decline in revenues from voice services**\(^{14}\): while the success of smartphones has led to increased data activities, it has contributed to the decline of revenues from voice services. Voice services was once one of the main channels of revenue for the entire industry, and network operators have yet to change their business models to fully adapt to this.

- **Increasing network and infrastructure costs**\(^{15}\): the success of smartphones has also led to an explosion in data traffic that continues to rise. To provide adequate network infrastructure to support this trend, investments need to be made to ensure capacity. The 2012 Olympic Games in London, as

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well as many other public events that bring about high concentrations of mobile users in the area, showed that the infrastructure available still cannot always handle the load and meet expectations for connectivity and reliability. With a large number of operators aggressively expanding their LTE networks to keep up with the market, investments are expected to be high for 2013.

- **A need to develop new business strategies**: aside from making large-scale investments, operators also have to develop strategies and capabilities to compete against new rivals. The success of smartphones and availability of high speed connections has opened the door for powerful and disruptive actors to provide their innovative services. These services, such as Skype and Whatsapp, allow messaging and VoIP calls between users. The operators, however, lose revenue on voice and message services, threatening their dominant position on the market. Incumbent mobile players are reported to struggle to compete against the more agile and innovative entrants.

- **Cost effective provision of fast mobile services to rural areas**: industry reports suggest that one of the biggest opportunities as well as one of the biggest challenges for the mobile industry is to provide fast mobile services to rural areas. More importantly, it is a challenge to do so cost effectively. Next generation network technology, i.e. LTE, has the potential to bring broadband internet services to rural areas. These networks, however, require significant investments.

2.4. **Clusters in mobile services industries**

Clustering of mobile services industries is a complex phenomenon. To date, no comparable literature exists nor have the trends in clustering of mobile services industries been described in detail. Nevertheless, a number of trends can be observed.

The mobile industry has showcased **increasingly more consolidation**. This causes changes in organisational settings, rapid turnover of top management and frequent radical changes in strategic objectives, and indirectly affects decision-makers at a product level. Consolidation can also lead to higher concentration of actors, as a fewer number of dominant players play an important role in the (surrounding) mobile ecosystem. These dominant players in turn attract innovative startups.

The mobile clusters analysed in this report tend to be **located near prominent ICT industries or clusters**. The Finnish ICT cluster is a prime example for this, but also the Vienna and Attiki regions are home to respectively an ICT cluster and prominent mobile industries. The emerging mobile services industries are strongly linked to the traditional ICT and mobile industries. Moreover, the strong interlinkages between content creators, mobile device manufacturers and network operators further stimulate collaboration between these groups.

**Prominent players in both the mobile and ICT industry have also started to stimulate the development of new mobile services industries**. AppCampus in Finland, for example, is supported by industry giants Nokia and Microsoft and aims to create a new generation of self-sustaining mobile startups. As AppCampus is led and managed by Aalto University, these startups are likely to cluster around the existing prominent industry in the area.

The abovementioned developments lead to the **emergence and growth of clusters in mobile services industries**. Clusters are generally seen as fostering technology and knowledge transfer among industry players.

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19 http://www.appcampus.fi/about/appcampus
and their suppliers and clients, thus contributing to the competitiveness of the sector. Geographically concentrated clusters may offer advantages in terms of more efficient use of resources and reduction in emissions due to reduced transportation needs. Clusters often emerge as a result of private initiatives. However, there are also various examples of clusters driven by policy initiatives or public-private partnerships\(^{20}\). In any case, public policy may provide an enabling environment, which can further strengthen the cluster and the competitiveness of companies within it.

\(^{20}\) Public-private partnerships can have distinct structures (contracts or partnerships) and modes of operation (e.g. “coproduction” and consensus building between public and private actors, risk-sharing arrangements, decision making, criteria used to select projects). They can add value in different ways: synergies, cost reductions, transaction costs, mobilisation of private resources etc. They need to be coordinated with other policy instruments (e.g., public R&D, financing, creation of markets for eco-innovation). Source: OECD (2011) “Better Policies to Support Eco-innovation, OECD Studies on Environmental Innovation”, OECD Publishing, available at http://dx.doi.org/10.1787/9789264096684-en
3. **Precursor stage: first interest in the emerging industry**

In this chapter, we elaborate on the framework conditions relevant to the development of mobile services industries in the region at the Precursor stage, the first stage of the industry’s lifecycle. We first address each specific framework condition in detail and then discuss the implications for policy makers at this stage of industry’s development.

### 3.1. Introduction

The Precursor stage corresponds to the activities that demonstrate the *first interest of the region in a particular emerging industry*. Specifically, this stage implies activities that support the initial development of a phenomenon of mobile services industries in the region, i.e., a business concept and/or underpinning service/technology platform, which stimulate industrial interest and investment in particular market-directed feasibility studies.

The following framework conditions have been identified as particularly relevant for this stage of industry’s development:

- Existing prominent ICT (equipment) industry (industrial; relevant for all stages);
- Multi-operator market structure (market; relevant for all stages);
- Critical mass of consumers with demand for high end devices with wide application areas (market; relevant for all stages);
- Critical mass of Science and Technology Researchers (knowledge; relevant for all stages);
- Mobile market liberalisation (regulatory and policy; relevant for all stages);
- Investments in next generation technology and networks (financial; relevant for all stages).

### 3.2. Existing prominent ICT industry

The presence of existing prominent ICT industry can be qualified as an *industrial framework condition*.

**Essence of Framework Condition**

This *industrial framework condition* is related to the fundamentals of the emerging mobile services industry. As discussed in Chapter 2, the mobile services industry builds on the existing telecommunications industry. More specifically, the existing telecommunications industry here comprises network operators, mobile device developers and manufacturers and equipment manufacturers. For the emergence of the mobile services industry, the existence of this traditional telecommunications industry, where network operators play a dominant role, is required.

The traditional telecommunications industry, in turn, is rooted in the ICT industry. This is because both the telecommunication devices and the operating network is highly technical. For telecommunication devices (i.e. mobile phones), chips for instance need to be developed. The semiconductors industry has traditionally played a crucial role in these developments. Moreover, the operating networks use leading-edge technology to provide increasingly higher transmission speeds, facilitate mobile internet and ensure quality of telecommunication services. The ICT industry therefore plays a crucial role in both developing and manufacturing these technologies.
The presence of this framework condition can be assessed by considering whether e.g. ICT industry, ICT equipment manufacturers and distributors are present, and to what extent.

Role of Framework Condition

The ICT industry provides generic technology that spurs a constantly growing number of related industries, producing complementary or value-adding services to the infrastructure. The industries that are highly relevant here are those producing digital content, which have also been regarded as having some of the most promising prospects21. ICT equipment manufacturers and distributors have also historically helped spur geographical clustering of relevant industry actors22. Although the literature disagrees on the degree to which this framework condition directly influences the emergence of the mobile services industry, it is undisputed that an existing prominent ICT industry is needed. The mobile services industry, after all, requires a platform to develop on.

Furthermore, existing prominent ICT industry is a key enabler for geographical clustering of relevant industry actors. This can be observed across various industries as well, with examples all over the world23. In the case of the ICT cluster in Finland, Nokia has had a profound influence on the development of the cluster24. However, not only Nokia has largely affected the growth of the cluster. The presence of major companies like Ericsson, Hewlett-Packard and many more ensure that the ICT cluster in Finland is regarded as a major technology hotspot25.

Influence of policy makers

This framework condition deals with the presence of prominent ICT (equipment) industry. Prominent ICT (equipment) industry is more likely to settle in a region that is more attractive to them. In order for policy makers to influence this framework condition, they can aim to increase the attractiveness of the region for this type of industry.

There are various ways in which policy makers can help raise the attractiveness of the region. Unsurprisingly, they not only increase the attractiveness of the region for the ICT industry, but also for other (high-tech) industries, such as the emerging mobile services industry. Examples of factors that raise the attractiveness of the region include26:

- Availability of skilled labour;
- Availability of (venture) capital;
- Presence of high quality educational and research institutions;
- High levels of R&D investment in the region.

Some of the factors relate to some extent to some of the framework conditions listed further in this case study (e.g. skilled labour, venture capital). They will therefore be discussed in detail at the relevant framework conditions. However, policy makers may find that specific policies in those areas raise the attractiveness of the region, positively influencing clustering of high-tech companies in the region.

Finally, policy makers may give (prominent) ICT companies an incentive to settle in the region by offering government funding, e.g. grants or subsidies. By compensating for part of the investment required for

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22 Ibid.
23 e.g. Fairchild in Silicon Valley, ASML in Eindhoven-Leuven and Nokia in the Finnish ICT cluster.
24 Granqvist, N., "New industry creation in knowledge-driven businesses – case mobile games industry in Finland", Center for Knowledge and Innovation Research, Helsinki School of Economics.
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companies to settle in the region, they are more likely to do so. This could be especially the case for equipment manufacturers, for which investment in manufacturing facilities and R&D often require high investment costs.

**South Finland: Key role of prominent ICT industry in the development of ICT industries in Finland**

The South Finland region showcases the importance of the ICT industry for the emergence of new mobile services industries. The mobile games industry in the region, for example, was born in conjunction of local games industry and mobile entertainment industry, and facilitated by the ecosystem created around Nokia. In addition, strong local ICT skills and orientation provided the necessary human capital. As a result, South Finland provided a fertile base for new ICT industry development. Moreover, the visionary leadership of Nokia is suggested to have contributed significantly to the development of the ICT industry in the region.

Nokia has played a crucial role in the emergence of the mobile games industry in Finland. Specifically, the company has supported the emergence of mobile games and other new mobile value added industries by participating in developing and building necessary platforms and networks to create the new industry creation. However, not only Nokia has largely affected the growth of the cluster. The presence of major companies like Ericsson, Hewlett-Packard and many more ensure that the ICT cluster in Finland is regarded as a major technology hotspot.

**3.3. Mobile market liberalisation**

Mobile market liberalisation deals with regulation and can thus be qualified as a regulatory and policy framework condition.

**Essence of Framework Condition**

Fundamentally, liberalisation can be defined as the transfer of decision-making from the public sector to the private sector. The degree to which this is initiated may differ. The minimal requirement of liberalisation is de-monopolisation, i.e. the situation where at least two actors compete to serve the market. Liberalisation, however, contains more elements than merely de-monopolisation. The greater the degree to which decisions concerning entry, market structure, investment, service provision, mode of provision, standards and pricing, are transferred to the market, the greater the degree of liberalisation. Full market liberalisation therefore means open, unrestricted entry and market determination of outcomes.

The difference between de-monopolisation and liberalisation is crucial for all industries concerned. An industry can both be fully de-monopolised and be subject to varying degrees of regulation. However, a de-monopolised industry that is subject to a high degree of regulation cannot be characterised as a liberalised industry. Moreover, liberalisation may even lead to the monopolisation of certain intermediate and retail markets.

**Role of Framework Condition**

Market liberalisation is not unique to the mobile services industry. In fact, many industries that were traditionally monopolised by the state find themselves in a similar situation (e.g. the network industries, energy industries and postal market). It is argued that market liberalisation introduces competition to the market, which theoretically may yield a more efficient market outcome.

The liberalisation of the mobile market has served as an important catalyst for the development of mobile industry clusters. With limited regulation on market entry and expansion, as well as limited to no protection in place for existing market actors, new players may enter the mobile market.

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27 Granqvist, N., “New industry creation in knowledge-driven businesses – case mobile games industry in Finland”, Center for Knowledge and Innovation Research, Helsinki School of Economics.


30 Ibid.
This, in turn, leads to geographical clustering of mobile services industries, such as in the Helsinki area\textsuperscript{31}. Moreover, as incumbent firms are challenged by market entrants and the potential for market entry

Furthermore, liberalisation of markets both results in \textit{international access to finance} (i.e. the capital markets) and \textit{provides global opportunities} for companies in the mobile services industries. Not only do liberalised markets allow for inwards Foreign Direct Investment (FDI), but liberalised markets elsewhere also allows for domestic players to expand their operations internationally\textsuperscript{32}.

\textbf{Influence of policy makers}

Policy makers have a direct effect on this framework condition. By deregulating the mobile services market, policy makers allow firms to enter the market. This is specifically possible if market entry and expansion faces limited regulation, and if existing market actors face limited to no protection from the authorities.

As argued above, it is \textbf{crucial to understand the difference between de-monopolisation and liberalisation}. Full liberalisation means \textit{open, unrestricted entry and market determination of outcomes}. As full liberalisation may, in fact, lead to monopolisation, an independent regulator can be introduced to ensure competition on the market.

Several key steps can be identified which policy makers need to take to fully liberalise the mobile services market. These are:

1. \textbf{De-monopolising the existing telecommunication industry}. As argued before, de-monopolisation is a key step towards market liberalisation. By de-monopolising the industry, competition is introduced to the telecommunication industries.

2. \textbf{Unbundling of vertically integrated actors on the market}. By separating the competitive segments from monopolistic bottlenecks, particularly of the network operators in the region, a playing field is created that can be further liberalised to introduce competition. A particular segment to consider is unbundling State-Owned network operators, those that specifically have a monopoly in telecommunication services and have full ownership of the telecommunication networks.

3. \textbf{Liberalising the competitive segments}. By liberalising the competitive segments, entry of new firms is possible. In other words, an element of competition is introduced. Entrants to the market should be allowed to exploit the existing networks to offer their telecommunication services. Moreover, they should be allowed to invest in a network of their own. Subsequently, policy makers should allow consumers free choice of provider. This further stimulates competition on the market.

4. \textbf{Introducing an independent regulator}, who is both responsible for making the transition from monopoly to market and ensures a level playing field for market participants. For the mobile services industries specifically, access to networks for entrants is crucial.

Finally, market liberalisation does not rule out all forms of regulation. In fact, for network industries, regulation still has an important component. This is best understood by considering the presence of so-called \textit{network externalities}. Network externalities imply social benefits that cannot be fully appropriated by the industry. Network externalities typically arise when consumer demand for a product or service increases with network size, as there are benefits to being connected to a larger network. Network industries, the telecommunications industries specifically, face substantial network externalities. A \textit{complete absence of regulation may lead to a sub-optimal market outcome} (e.g. smaller network sizes, implying smaller social benefits). Additionally, \textit{network externalities provide incentives for firms to engage in anti-competitive}


\textsuperscript{32} Ibid.
behaviour\textsuperscript{33}. Put differently, because network externalities exist, societal gains may be achieved by imposing specific regulation that maximises outcomes (e.g. larger networks, better coverage, market competition, service innovation). Introducing an independent regulator that e.g. ensures competition, network access and network stability helps to overcome these negative effects.

**South Finland: Market liberalisation provided global opportunities and a first mover advantage to the Finnish cluster\textsuperscript{34}**

In Finland, liberalising the telecommunication market as one of the first in the world, took place between 1988 and 1994. It has had a significant impact on the development of the industry, with reports claiming that it prompted a breakthrough in in digital communications\textsuperscript{35}.

The turn of the 1990s contained several external incidents with significant repercussions on the Finnish ICT cluster. These events ultimately led to an average 30% annual growth rate of the sector. Deregulation of European telecommunication markets has been identified as one of the most influential external factors in this. Particularly, the opening of the East European markets gave an additional boost to the demand for mobile equipment.

Simultaneously, regulators allowed private companies to apply for GSM licences to operate mobile networks. The liberalisation of the telecommunication market in Finland culminated in the GSM licence that was granted to the private partner Radiolinja\textsuperscript{36}. The subsequent liberalisation of the Finnish market gave an important boost to the Finnish cluster. Had Radiolinja postponed the licence application, the funding sources — abundant in the late 1980s — would have probably dried up on the edge of the economic slump about two years later\textsuperscript{37}.

On the business side, Nokia ran into a crisis in the beginning of the 1990s that was almost to destroy the company. In the search of rapid growth and global market presence the company ran into serious production and financial difficulties. This coincided with the collapse of the Russian trade and abrupt recession in the economy. At the time, however, a wave of liberalisation hit mobile markets all over the world. Coupled with a subsequent boost in global demand for digital mobile equipment and Nokia’s global preparedness in providing them virtually saved the company.

### 3.4. Multi-operator market structure

The presence of a multi-operator market structure qualifies as a *market framework condition*.

**Essence of Framework Condition**

This framework conditions implies that multiple operators, i.e. those companies that offer telecommunication services, are present on the market. Specifically, *multiple network operators should be present on the market*. In other words, the telecommunication industry is not monopolised. Moreover, consumers have freedom of choice between the different network operators.

Under the mobile market liberalisation framework condition, it was already explained that it is crucial to understand the difference between de-monopolisation and market liberalisation. *Market liberalisation itself does not guarantee a multi-operator market structure*. Especially considering the presence of network externalities, firms may engage in anti-competitive behaviour, deterring entry on the market\textsuperscript{38}. Moreover, a fully liberalised market may consolidate and become monopolised.

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\textsuperscript{34} Ibid.


\textsuperscript{36} Ibid.


Although this framework condition is highly related to market liberalisation, it should be considered separately. **Having a multi-operator market structure gives room for competition on the market**, increasing the pressure on the incumbent firms to innovate.

**Role of Framework Condition**

A multi-operator market structure implies a number of benefits that are relevant for the emergence of mobile services industries. **In a monopolised industry, the incumbent firm has less incentive to innovate.** This is especially true for industries with high entry barriers. Incumbent firms are neither seriously threatened nor face competitive pressure to innovate their services in order to supply the market.

**The traditional telecommunications industry is a key example for such an industry.** The capital intensive nature of the industry, ownership of telecom licenses, and the requirement of specialised operating skills impede market entry. Conversely, exit barriers are high due to the e.g. the required specialised equipment\(^3\). Nevertheless, the size of the market and the opportunities it provides encourages firms to enter the market.

A multi-operator market structure, combined with mobile market liberalisation and capital market liberalisation, allows for competitive pressure on firms to innovate. Moreover, competitive pressure may also stimulate firms to expand their market to new user groups, financed locally or through foreign direct investment. This in turn leads to geographical clustering of actors\(^4\).

Finally, a heed of caution needs to be mentioned in this discussion. While a multi-operator market structure likely introduces competitive pressure, the academic literature shows that more is not always better. In the literature, the relationship between competition and innovation is sometimes depicted as an inverted U-curve. While more competitive pressure may lead to higher incentives to innovate (e.g. by moving from a monopoly to a competitive oligopoly market structure), the opposite may also hold\(^5\).

This is also confirmed to hold for a number of mobile markets around the globe. Despite the large number of operators in India (8), for example, population coverage in that country lags significantly behind Jordan (4), China (3) and the Philippines (3)\(^6\). It is suggested that **many smaller mobile operators focus on the more profitable urban areas and lack the resources and/or interest to roll service out to rural areas**\(^7\). Exactly in those areas, however, the majority of people reside whereas social benefits of mobile connectivity are as high, or potentially higher, than in well-served urban areas. Furthermore, as more operators enter the market and competition intensifies, the utilisation levels and profitability of many carriers drop. Both their incentive and their their ability to invest in mobile networks falls as a result\(^8\).

**Influence of policy makers**

The influence of policy makers on this framework condition is rather similar to the influence they can exert on liberalising the mobile market. This framework condition, however, specifically deals with having a multi-operator market structure in place. The influence of policy makers is therefore twofold:

1. If there is no multi-operator market structure in place, **policy makers need to create such a market structure**. Both de-monopolisation of the market and unbundling of industries are relevant policy instruments, as well as privatisation of State Owned Enterprises (SOEs).

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\(^7\) Ibid.

(2) If a multi-operator market structure is already in place, **policy makers need to sustain this type of market structure.** By putting a regulator in place that oversees competition on the market as well as takes the desired market structure into account, a multi-operator market can be sustained. For example, a National Competition Authority may be empowered to assess mergers and acquisitions, ensuring that the local market is exposed to ample competitive pressure.

Furthermore, empirical evidence shows that the presence of more operators (i.e. more competitive pressure) does not necessarily equal more innovation. Preferably, the effect of the competitive pressure on innovation should be carefully assessed.

### 3.5. Critical mass of consumers with demand for high end devices with wide application areas

This **market framework condition** implies the presence of a sufficient mass of consumers with demand for high end devices with wide application areas.

**Essence of framework condition**

A critical mass of consumers, and more specifically sufficient **local demand conditions** for high end mobile devices and services, is a prerequisite for establishing mobile services industry as well as a condition for accelerating growth. Demand conditions refer to the type of users and size of the market. Firms that face a sophisticated domestic market are likely to sell superior products because the market demands higher quality, and a close proximity to such consumers enables firms to better understand the needs and desires of the customers. Moreover, firms that are in close proximity of their end-users may come up with more innovative solutions.

This framework condition works the other way around as well. Mobile service companies often come up with innovative services for which demand is created due to the radical nature of the service offering. **These companies are in need of a critical mass of consumers to deliver their novel services.**

Finally, consumers are highly sensitive to factors such as **price, quality and reliability.** There are, however, numerous other factors that play an important role in the purchasing behaviour of consumers, all embodying the cultural capital index of a particular region. Examples of relevant high end devices for private consumers include smartphones and tablets.

**Role of framework condition**

**Even though critical mass of consumers is required for mobile services industries to take off, not all mobile services industries require this to be present in the region.** Increasing portability of high end mobile devices and mobile network innovation allow users to access products all over the world. Coupled with new distribution models (which will be discussed later on in this case study), mobile services industries have access to a much larger market than the local region. Nevertheless, critical mass of high end mobile device users on the local is still argued to drive the emergence of these industries in the regions. They may, however, find that their revenue is earned on an increasingly global market.

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Influence of policy makers

Policy makers can stimulate the creation of a critical mass of consumers by stimulating the demand for high end mobile devices. Examples of measures stimulating the demand include (pre-commercial) public procurement and making services available for high end mobile devices, such as providing citizens a mobile portal for a number of public services.

3.6. Critical mass of Science and Technology Researchers

This knowledge framework condition implies the presence of a critical mass of high quality Science and Technology Researchers. This also includes the presence of qualified ICT engineers.

Essence of framework condition

R&D&I is a key driver for industries that heavily relies on technological progress. The emerging mobile services industries are highly related to this. For the new mobile services industries to emerge, prominent ICT industry needs to be in the region as well as investments in next-generation technologies. Moreover, there needs to be ample demand for high end mobile devices, which are the result of technological progress. Innovative industries, such as the mobile services industries and the related ICT industries, as a result need to have access to highly skilled human capital. In particular, there needs to be a critical mass of Science and Technology Researchers, and of qualified ICT engineers.

Role of framework condition

To achieve the necessary technological progress, the industries need highly skilled researchers. It is therefore important for an innovation cluster in the Precursor stage to have access to competent human resources as well as world class researchers. Specifically for the mobile services industries, the availability of science and technology researchers serves as an important knowledge framework condition that leads to geographical clustering.

However, a major challenge in the EU remains the shortage of sufficient skilled labour. In the area of e-skills alone, for example, the level of computer science graduates is declining, while up to 700.000 ICT practitioners will be needed to fill vacancies in the EU by the year 2015. Europe’s shift from heavy industry to more specialised manufacturing and services, combined with generally low prestige for highly technical professions, has outpaced the development of Europe’s educational system.

Influence of policy makers

The influence of policy makers can be approached from two different sides. On the one hand, policy makers can aim to attract highly skilled researchers and ICT engineers to the region. This can be considered as a more direct approach, as this type of human capital would be immediately accessible to industry once they settle in the region. On the other hand, policy makers can foster highly skilled human capital by investing in education.

Regarding directly attracting highly skilled human capital to the region, it can be observed in prominent clusters all over the world that regional stakeholders typically stress the attractiveness of the region. They also often create awareness for both the region as a place to live and as an innovative hotspot.

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Alternatively, policy makers can influence the availability of highly skilled human capital in the region by promoting education and careers in both the ICT and mobile services industries in the region. Education authorities in close cooperation with industry should develop both policies and education programmes that raises awareness and attractiveness of the ICT and mobile services industries under students, and fosters high quality researchers and engineers. This also implies that graduates should be stimulated to take up research positions in the field of Science and Technology. By actively promoting and stimulating education and careers in these industries, more highly skilled human capital becomes available over time.

An important consideration here is that critical career decisions are being made already more than a decade before a student enters the workforce. For example, middle school students must make the decision to take appropriate math and science courses that will prepare them for higher education in science & engineering fields about 14 years before they start working. Consequently, the promotion of education and careers in high tech fields, such as the ICT and mobile services industries, cannot start early enough. It is crucial to offer children early technical education programmes that broaden their choice and development opportunities. These programmes need to motivate children to want to learn more, transmit the excitement of science investigation and engineering innovation, and provide teachers with the appropriate tools to facilitate the learning process.

The need to continue investing in such initiatives is acknowledged in the future EU programmes. Under Horizon 2020, the Commission aims to continue and reinforce actions to attract young people to KETs and include training activities aimed at improving skills in KETs product demonstration projects. Examples of such measures refer to developing partnerships between education and business such as Knowledge Alliances for Higher Education in order to foster innovation and allow for more targeted curricula with regard to market needs including KETs.

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**Vienna region (Austria): promoting the attractiveness of the region**

The Vienna administration actively promotes the attractiveness of its region through various aspects. The City of Vienna has a dedicated website that details the attractiveness of the region. Aside from stressing the cultural heritage of the city, they also explicitly claim that it is Europe’s most innovative city.

The claim for Europe’s most innovative city is based on the Innovation Cities Global Index, which is published annually by the Australian innovation agency 2thinknow. The index is published annually to help innovators decide which places in the world offer them the best conditions for realising their innovative ideas.

The agency compared 445 cities across the world in respect of their innovative potential. Moving up two places compared to 2011, Vienna came in third worldwide, just behind the US-based Boston and New York, for 2012.

According to the index, Vienna is currently the most innovative city in Europe, followed by Paris, Munich and London as well as Copenhagen and Amsterdam. Moreover, the City of Vienna communicates that the Austrian capital was also awarded the title Nexus City, which is reserved to the 35 most innovative cities of the world.

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3.7. **Investments in next generation technology and networks**

This **financial framework condition** implies investments in next generation mobile technology and networks (e.g. 2G, 3G, 4G, WIFI, GPS), both from governments and private companies.

**Essence of framework condition**

In this case study it was already established that existing prominent ICT industry needs to be in place. Moreover, a traditional telecommunication industry is needed before mobile services industries are likely to emerge. As the emerging mobile services industries are highly dependent on the technical capabilities of mobile devices and telecommunication infrastructure, **mobile service innovation mostly occurs in new technology paradigms**\(^{55}\).

To enter these new technology paradigms, investments in next generation mobile technology and networks (e.g. 2G, 3G, 4G, WIFI, GPS) are needed. These investments come from both governments and private companies. Governments have an incentive to invest as the new technologies potentially reap high social benefits. Examples include more access to mobile and communication services in rural areas (e.g. through higher range of new network technologies) and potential to use the technologies for government related applications (e.g. the military). Private companies have an incentive to invest through the ability to e.g. gain a competitive advantage or to increase their (potential) market.

**Role of framework condition**

Investments in next generation technology and networks, especially in telecommunication infrastructure, **have historically driven innovation in the traditional telecommunication industries**. The second generation network (2G) gave rise to the highly successful text messaging (SMS), which was followed by ring tones and logo downloads. The third generation network (3G) marked the dawn of mobile internet, which spurred innovative companies to develop new mobile services such as WhatsApp, mobile browsing and, coupled with the Global Positioning System, mobile navigation solutions\(^{56}\). The fourth generation network (4G) allows for even higher mobile internet speeds. For instance, the 4G-network is expected to be powerful enough to provide users in rural areas with broadband internet access\(^{57}\).

**Next generation technology and networks is a game changer for the mobile services industries.** Without innovation in this area there would be no platform for the emerging mobile services industries to develop on. Investments in next generation technology and networks are thus a necessary prerequisite for mobile services industries to emerge.

**Influence of policy makers**

There are several ways through which policy makers can influence investments in next generation technology and networks. One the one hand, **policy makers can provide incentives to private companies to invest in these technologies**, e.g. by providing subsidies, giving out preferential loans or by guaranteeing loans. On the other hands, **policy makers can provide direct government investments**, e.g. to stimulate internet penetration within the region or by directly investing in next generation data networks.

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**South Finland: Cognitive Radio Trial Environment+ (CORE+) consortium**\(^{58}\)

CORE+ (Cognitive Radio Trial Environment +) is a Finnish research consortium that consists of three research organisations: VTT Technical Research Centre of Finland, Centria University of Applied Sciences and University of

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\(^{56}\) Ibid.


Oulu; seven industry companies: Nokia Siemens Networks, PPO-Yhtiöt, EXFO, Elektrobit, Renesas Mobile Europe, PehuTec, and Rugged Tooling; and two governmental organisations: the Finnish Defence Forces and Finnish Communications Regulatory Authority (FICORA). The project is funded by Tekes – the Finnish Funding Agency for Technology and Innovation in “Trial Environment for Cognitive Radio and Networks” program.

The aim of the programme is to transform Finland into a globally attractive cluster of expertise and unique trial environment for cognitive radio and networks. The trial environment enables the research and development of products, services and applications associated with cognitive radio.

Current wireless networks are struggling to carry the data traffic generated by smartphones and other mobile devices. Cognitive radio is expected to provide a significant boost for wireless communications and introduce new business opportunities.

The first spectrum sharing trial of the Authorised Shared Access (ASA) concept with live LTE network operating in the 2.3 GHz band has been demonstrated in Finland on the 25th of April 2013. The trial was carried out by the Finnish CORE+ consortium. The new approach allows the possibility of providing extra bandwidth easily for 4G networks. By enabling mobile services to share this band with existing services based on ASA, the overall available bandwidth for mobile broadband may be extended by up to 18%.

**Attiki region (Greece): The “SYZEFXIS” project**

The “SYZEFXIS” project is the first venture of providing big scale broadband telecommunication services in Greece. “SYZEFXIS”, which means “coupling” in Greek, was financed by the Greek Ministry of the Interior, Public Administration and Decentralisation under the Operational Programme “Information Society” in the framework of Measure 2.2. The project aimed to connect all the bodies of the public sector (hospitals, social insurance funds, libraries etc), the public administration and local authority to broadband networks for their internal communication.

The project’s objectives were twofold:

- improvement of public services’ functions supported by the upgrade of telecommunications infrastructure between them through the offer of advanced and low cost telematic applications;
- provision of integrated services to citizens using modern and user-friendly government information and transaction systems.

The project spurred modernisation of the telecommunication networks in the Greek regions, which was needed for realising the project’s objectives.

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4. **Embryonic stage: entering a market environment**

In this chapter, we elaborate on the framework conditions relevant to the development of mobile services industries in the region at the Embryonic stage, the second stage of the industry’s lifecycle. Similar to the previous chapter, we first address each specific framework condition in detail and then discuss the implications for policy makers at this stage of industry’s development.

4.1. **Introduction**

The Embryonic stage corresponds to the activities that support the improvement of the reliability and performance of technology and services to a point where it can be demonstrated in a market environment. Specifically, this stage implies activities that help to demonstrate the commercial potential of technology and services in the region through revenue generation.

The following framework conditions have been identified as particularly relevant for this stage of industry’s development:

- Availability of seed and venture capital for mobile services companies (financial, relevant also for Nurture and Growth stages);
- Policy measures promoting entrepreneurship in mobile services industries (regulatory and policy, relevant also for Nurture and Growth stages).

4.2. **Availability of seed and venture capital for mobile services companies**

The availability of seed and venture capital can be classified as a financial framework condition. In high tech and emerging industries, access to capital is often regarded as an essential factor condition. Seed and venture capital both provide channels through which funding can be acquired. For the mobile services industries specifically, the availability of seed and venture capital enables companies to start-up and grow in an early phase of the industry lifecycle.

**Essence of framework condition**

Young firms in high tech areas need time after they have been set up to expand, but when they do so, these firms belong to the principal generators of economic growth and employment. These innovative firms should therefore be assisted in their initial phase of development with capital in order to reach the high development level successfully. According to empirical studies, firms that can profit from venture capital achieve much higher innovation performance. The increased competition which accompanies the increased importance of innovative firms is highly beneficial and can also help the old enterprises to increase their level of innovating and thus contribute to the growth more intensely. Another empirical study for Europe indicates that firms assisted with venture capital achieve substantially higher growth rates than old enterprises that have not experienced such assistance.\(^{60}\)

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**Role of framework condition**

The academic literature suggests that **access to finance plays a crucial role in boosting innovation. This role has two dimensions: accelerating growth and ensuring long-run success.** First, investors provide the capital to speed the development of companies. Second, the evidence suggests that the early participation of venture firms helps innovators sustain their success long after their company goes public and the venture capitalists move on.

An important aspect to consider is that it is often difficult for emerging industries to acquire the necessary funding on the capital markets. Reason for this is that investing in high tech start-ups in emerging sectors is considered as a rather risky business for investors. Specifically, there is a **technological risk** (i.e. whether the company succeeds in successfully developing the technology) and a **commercial risk** (i.e. whether the technology is successfully commercialised) involved. Investors in the mobile services industries especially face a commercial risk. A growing academic base explains that in order to be successful in the emerging mobile industries, companies often need to come up with innovative business models.

**Influence of policy makers**

Typically in high tech industries, revenues are earned much later after the initial investment has been done. In other words, it takes considerable time for the investor to reach their pre-determined Return On Investment (ROI). Therefore, there is a need for substantial and long-term financing. There is however insufficient level of venture capital available in the European clusters in general. This leads to deprivation of the innovative activities and slower growth of SMEs, and the whole financing burden is often placed on the public funding.

Therefore, in Europe, the public authorities have a role to play in ensuring growth in this type of private financing, particularly in the high-tech sectors. **One of the biggest challenges in the clusters is suggested to be the need to increase the level of private venture capital.**

Access to European funding is especially hampered because of the **complicated administrative requirements** for companies in the clusters. Especially smaller companies have difficulties to cope with these requirements. Furthermore, it is often difficult to strike a balance between what the founders/owners demand for their shares and what the venture capitalists are willing to pay. This often creates delay in the process of financing. Finally, some companies complain that the **subsidy landscape in Europe is too fragmented** to be of any support.

By providing targeted and increased support to the industry from EU Community Budget, the European Investment Fund and European Investment Bank, this challenge could be countered. This support from EU government bodies can take the form of **providing a package of financial instruments to cover different company sizes and structures** (e.g., loans, guarantees, grants and tax incentives) aimed at increasing the attractiveness for the private sector to invest in European mobile services industry product development activities. Several examples exist where investment syndicates were established through which the public sector carries the technological risk and private investors carry the commercial risk of an enterprise or project.

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**Vienna region (Austria): INiTS supports innovative startups**

INiTS is a business incubator in the Vienna region designed to improve the rate of startup success in Vienna. They support young entrepreneurs by helping them conceive, launch and grow an innovative company. During an 18-month long program, INiTS actively supports startups by providing funding, hands-on support, resources, a network and an office space. The program is aimed at bright and ambitious graduates, staff and students of the Vienna universities and technical colleges with great ideas. The organisation has considerable expertise in the mobile and ICT industries.

INiTS, the Viennese center of the AplusB program of the Ministry of Infrastructure, is a company of ZIT – the Technology Agency of the City Vienna, University of Vienna and the Technical University of Vienna. They are funded by the European Union through the EFRE INTENS project.

**South Finland: The Finish Funding Agency for Technology and Innovation (Tekes)**

Tekes is the most important publicly funded expert organisation for financing research, development and innovation in Finland. Their support relates to a wide-range of innovation activities in research communities, industry and service sectors. Besides funding technological breakthroughs, the organisation emphasises the significance of service-related, design, business, and social innovations. Moreover, they work with the top innovative companies and research units in Finland. Every year, Tekes finances some 1,500 business research and development projects, and almost 600 public research projects at universities, research institutes and polytechnics.

Together with the business community and researchers, Tekes identifies strategically important areas of R&D and designs programmes to provide opportunities for carrying out ambitious R&D projects and for developing business expertise and international cooperation. An example for this is the CORE+ project funded by Tekes, which has the potential to further increase capacity on 4G networks to cope with the increasing data traffic in mobile services. Moreover, Tekes programmes are forums for the exchange of information and networking between companies and research groups.

By sharing the risks associated with challenging research and development projects, Tekes encourages businesses to take greater leaps in innovation development than would be possible without public R&D funding.

### 4.3. Policy measures promoting entrepreneurship in mobile services industries

This **regulatory and policy framework condition** implies all policy measures that stimulate entrepreneurship in the mobile services industry.

**Essence of framework condition**

Once the fundamental factors, such as the necessary mobile technologies and a demand for new mobile services, have emerged, further stimulation of mobile services industries can take place in the form of promoting entrepreneurship in these emerging industries. The essence of the framework condition is that by promoting entrepreneurship in the mobile services industries, awareness for new business opportunities is created and/or increased.

**Role of framework condition**

Mobile service clusters in the Embryonic stage are **helped by an environment that promotes entrepreneurship**. As awareness of new business opportunities increases, the emerging industries start attracting new investors and start showcasing new business ideas. Depending on the attractiveness of the business opportunities, one can expect both incumbent firms and start-ups to become interested in developing...
new mobile services. Put differently, policies promoting entrepreneurship in the mobile services industries lead to increasing business activity in the industry, both from existing and new firms. This framework condition furthermore increases geographical clustering, especially when entrepreneurship is promoted within regional clusters.

**Influence of policy makers**

Policy makers can successfully influence entrepreneurship in mobile services industries by actively promoting the region as a place to engage in this emerging industry. There are several ways to promote entrepreneurship in mobile services industries in the region. Policy makers can:

- **Stimulate public-private partnerships focused on innovation**, specifically in the field of telecommunications and mobile services\(^{68}\). Public-private partnerships in mobile technology and mobile services are more likely to result in new solutions, characterising the emerging mobile services industries.

- **Provide government-backed vouchers for innovation support**. These vouchers can positively influence the entrepreneurial climate in a cluster in the Embryonic stage\(^ {69}\).

- **Stimulate the creation of service innovation and promotion platforms**. These platforms both stimulate service innovation and bring attention to the new mobile services industries.

- **Create Working Groups** to discuss goals, ambitions and future policy actions for the ICT and mobile services industries. Research and discussions resulting from these Working Groups can be used to formulate ambitions, policy goals and establish a roadmap for mobile service innovation.

**South-Finland: 21 paths to a Friction-Free Finland\(^ {70}\)**

A number of actions have been actions taken in the Finnish policy to increase the entrepreneurship in the ICT and mobile services sector. One example relates to the action proposals in the ICT 2015 Working Group's report “21 paths to a Friction-free Finland”. In this report, the Work Group established a roadmap for long-term efforts to make Finland a leader in information technology applications over the next 10 years. The report contains proposals for measures to be carried out in 2013.

Major proposals in the report include the construction of a unified national IT architecture which would make it easier to create electronic services across organisational boundaries. The report also calls for a ten-year, 20 million EUR programme for research, development and innovation that would bring together the central players in the industry, such as universities, research centres, companies and investors. In addition, a new funding programme worth 25 to 40 million EUR should provide adequate finance for start-ups and companies in the growth phase. The report also calls for more training in the games, security and big data sectors of the industry, more research in the mobile sector, and the creation of an open data ecosystem.

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5. Nurture stage: demonstrating sustainable business potential

In this chapter, we elaborate on the framework conditions relevant to the development of mobile services industries in the region at the Nurture stage, the third stage of the industry’s lifecycle. Similar to the previous chapters, we first address each specific framework condition in detail and then discuss the implications for policy makers at this stage of industry’s development.

5.1. Introduction

The Nurture stage corresponds to the activities that help to improve the price and performance of applications to a point where sustainable business potential can be demonstrated. Specifically, this stage implies developing a market with mass growth potential.

The following framework conditions have been identified as particularly relevant for this stage of industry’s development:

- Critical mass of mobile services companies (industrial; relevant also for Growth stage);
- Collaboration between regulators and operators (cultural; relevant also for Growth stage);
- Policy measures supporting internationalisation in mobile services industries (regulatory and policy; relevant also for Growth stage);
- Presence of a platform to promote service innovation in the area (support; relevant also for Growth stage);
- Dedicated cluster organisation (cluster manager or similar) to coordinate the development of mobile services industries in the region (support; relevant also for Growth stage).

5.2. Critical mass of mobile services companies

This industrial framework condition implies the presence of a sufficient mass of companies in mobile services industries.

Essence of framework condition

The emerging mobile services industries include a wide range of companies. As discussed in the introduction of this case study, the emerging mobile services industries include both traditional ICT and telecom industries, and innovative companies offering new mobile services. The former are typically large industry players with a significant presence in the region, such as Nokia in the Helsinki ICT cluster. The latter, in contrast, often comprise innovative start-ups. Companies delivering these services are necessary in order to improve the competition, price and performance of their offerings. The presence of a critical mass of companies is beneficial for nurturing and growth.

Role of framework condition

Large firms can play a catalytic role in a number of ways. First of all, they create a critical mass of experienced managers and workers. Secondly, they can provide a customer and supplier base. Thirdly, large companies provide ideal conditions for high technology firms to grow and develop. Finally, large companies
have multiplier effects in terms of a region’s local economy for materials and services (these can range from university graduates to office supply services to raw materials’ production). Therefore, large firms can play a key role in diffusing knowledge and technology to SMEs, nurturing future entrepreneurs and inspiring spin-outs. They can be important in terms of stimulating innovation sales and exports and provide a critical ‘route to market’ for SMEs, both directly and as a base for access to world markets. Where firms do not take forward innovative ideas themselves, employees of large firms sometimes choose to start-up their own businesses to fill a perceived gap in the market.\(^71\)

At the same time, many innovative ideas usually come from small dedicated firms. As large firms become even larger (e.g., due to mergers and acquisitions), they usually do not increase their amount of scientific discoveries with the same pace. In fact, existing research shows that large firms typically experience a decreasing number of discoveries.\(^72\) The proximity of small companies to large firms provides partnering opportunities for product development, manufacturing and marketing, and a source of management expertise for small companies.

**Influence of policy makers**

The key task of policy makers is to create an environment favourable for setting up and expanding businesses in the region. The relevant measures include ensuring easier access to funding, making legislation clearer and more effective and developing an entrepreneurial culture and support networks for businesses.\(^73\)

A vibrant business climate for mobile services companies in the region is a highly complex phenomenon resulting from a wide variety of factors. Key relevant measures can be summarised as follows:

- Promoting the concept of mobile services industries in the region (e.g., social marketing and advertising campaigns promoting mobile services industries, new mobile technologies and applications in the region, as well as incentivising the purchase of high end mobile devices to allow for new mobile services);
- Promoting entrepreneurship in the mobile services industries;
- Developing public-private partnerships;
- Simplifying access to finance for mobile services companies;
- Introducing programmes that support SME growth (financial support; training and coaching) etc.

Details on the relevant measures can be found throughout the report (e.g. under the relevant framework conditions related to increasing awareness of mobile services industries in the region, promoting entrepreneurship in the mobile services industries, etc.)

### 5.3. Collaboration between regulators and operators

This cultural framework condition is related to (active) collaboration between regulators and operators active in the mobile services industries. They can often be identified by the presence of e.g. regulation that encourages development and market adoption, or by meetings or joint sessions between regulators and operators.

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Essence of framework condition

In the mobile services industries, a number of regulators and operators are often active. This is especially the case for a multi-operator market in a liberalised mobile services industry. As was explained under the market liberalisation framework condition, a liberalised market does not imply complete absence of regulation. For instance, regulators may monitor the competitiveness of the market, protect consumers, or ensure that there is ample supply. Put differently, regulation deals with the so-called network externalities.

Moreover, a different type of regulation also exists. While the former described market regulation, which sees to proper functioning of the market, there can also be regulation in place that encourages development and market adoption. For this type of regulation it is crucial for regulators and operators that are active in the field of ICT, telecommunications and mobile services to collaborate actively.

Role of framework condition

Cooperation between regulators and network operators can stimulate the development of mobile services industries in the Nurture stage. Developments in emerging markets have shown that regulation under certain conditions can allow the emerging industries to generate economic gains. This particularly holds for regulation that encourages development and market adoption, as well as for the meetings or joint sessions from which they originate. This sort of cooperation serves as a regulatory framework condition that increases cooperation and sharing among the relevant stakeholders.

Furthermore, by closely cooperating, regulators and operators can jointly overcome the problem of network externalities. As explained earlier in this case study, the presence of network externalities may prevent markets free from regulation to reach the optimal market outcome. This can e.g. result in a lack of coverage in rural areas, where substantial economic gains can be generated.

Influence of policy makers

Regulators must work together with operators to lower the cost of ownership, ultimately driving down the costs of mobile phones and mobile services. Moreover, as detailed earlier in this case study, there may be considerable benefits in extending coverage to rural areas. Furthermore, they need to understand that collaboration provides a solution to problems that arise from network externalities.

Policy makers should therefore actively seek collaboration between regulators and operators. This can for instance be facilitated by setting up joint meetings between operators and regulators to discuss current issues and new regulation. Moreover, platforms and associations exist that specifically aim to stimulate discussion between operators and regulators. An example within our sample is the Finnish Mobile Association, which attempts to address, among other things, this particular issue. Policy makers should therefore also setup and/or support these industry platforms and organisations. They can do so by e.g. providing funds, but also by reaching out to these organisations and setting up meetings between regulators, operators and supporting platforms or associations.

5.4. **Policy measures supporting internationalisation in mobile services industries**

This *regulatory and policy framework condition* includes policy measures supporting the internationalisation of mobile services industries.

**Essence of framework condition**

As a regional mobile services industry matures, the strongest growth opportunities for most sectors are considered to be outside the regional or national market, in fast growing emerging economies. For this reason, EU and Member State initiatives to support mobile services industries in *understanding and accessing export markets should be pursued and expanded* to stimulate growth.

**Role of framework condition**

International markets provide new opportunities for the emerging industries. Not only does internationalisation allow for access to bigger markets (i.e. more consumers), it also offers clear advantages for both large firms and SMEs.

Considering the benefits for large enterprises, we can distinguish between two theories in the academic literature: the *theory of foreign direct investment* and *the theory of multinational firms*. The theory of foreign direct investment suggests that portfolio diversification helps to reduce performance risk as investments in different locations face different levels of and exposure to risk. Furthermore, economies of scale and scope lead to a reduction in costs, e.g. by utilising excess capacity and sharing of common functions77.

The theory of multinational firms emphasises that *firms benefit from internationalisation through pooling of resources, talents and innovations across geographical boundaries*. Such pooling would not occur otherwise. Likewise, the merging of systems and business processes from different geographical locations helps to increase the competitiveness of the firm. Moreover, access to a global market increases financial leverage and arbitrage opportunities78.

Regarding the benefits for SMEs, *a direct link between internationalisation and increased SME performance has been established*79. It has been suggested that international activities reinforce growth, enhance competitiveness and support the long-term sustainability of companies. Increasing the number of internationally active SMEs may bring about welfare gains for the region as a whole, suggesting that public support should play an important role in promoting greater internationalisation80.

**Influence of policy makers**

Examples of the policy measures supporting internationalisation include regional support in representing the cluster abroad; regional support for inward investment activities; removal of custom duties on ICT and high end mobile devices, as well as training and coaching etc.

For the internationalisation of the telecom industry, it has also been argued in the economic literature that national government’s pampering of the incumbents has been highly influential in their emergence as global players. *This is particularly true for the “National Champion”-policies*. Especially in cases where incumbents faced protection on the domestic market, mostly after waves of privatisation, deregulation and liberalisation, it has been observed that these companies went abroad aggressively. By enjoying a relatively low

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78 Ibid.
80 Ibid.
risk domestic market, they leveraged their capital to invest in liberalised markets abroad. This allowed prominent telecommunication companies to expand their business internationally.

Finally, as the mobile services industries consist of many SMEs, it is crucial to consider the internationalisation of this group of companies in more detail. Based on a collection of good practices from various industries, a set of nine areas have been identified in the literature with regard to the internationalisation process of SMEs:

1. Raising awareness;
2. High value information;
3. Human resources’ development programmes;
4. Supporting the financial needs of internationalisation;
5. Promotion of networks;
6. Supporting the internationalisation of services;
7. Using internationalisation to enhance competitiveness;
8. Individualised support;

In the analysed regions, we have observed that for the mobile services industries raising awareness, supporting the financial needs of internationalisation, supporting the internationalisation of services and stimulating cross-border cooperation have been of high importance. Policy makers, therefore, should pay close attention to these areas and introduce policies to support these areas in particular. In addition, match making services provided by clusters were also noted to be of considerable help for the internationalisation of the industry.

**South Finland: FinnMob – the Finnish Mobile Association**

The Finnish Mobile Association (FinnMob) is a matchmaking, networking and services organisation creating opportunities for startups, corporates and investors, who have the common desire to maximise business potential of mobile devices, applications and services. By participating in the FinnMob community, members and partners drive the transformation and growth of the mobile ecosystem that is converging with media. FinnMob promotes and builds awareness of one of the world’s most successful mobile clusters at global industry events and exhibitions.

FinnMob was founded in 2009 to create a network for the innovative Finnish mobile, technology and design industries. As the domestic market in Finland is limited, one of the main tasks of the organisation is to help Finnish companies go international and expand their business opportunities worldwide. They encourage members to realise the global potential for their products and services.

What FinnMob does is open doors and networks for companies in the mobile ecosystem so they can take an advantage of the huge range of opportunities convergence brings. Moreover, they promote Finnish companies and build a brand of Finland’s mobile expertise.

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83 http://www.finnmob.com
5.5. **Presence of a platform to promote service innovation in the area**

This **support framework condition** implies the presence of a platform to promote mobile service innovation in the region. (e.g., by means of conferences and seminars on service innovation)

**Essence of framework condition**

The presence of a platform to promote service innovation closely ties in with the framework conditions to raise awareness for the emerging industries and to facilitate collaboration between regulators and network operators. **The so-called innovation platforms are not unique to the mobile services industries.** In fact, the European Commission supports a number of innovation platforms through the KIS Innovation Platform, funded under Europe INNOVA.

**Innovation platforms aim to accelerate the take-up of services innovations in Europe.** To achieve this, attention is paid to the development and testing of new or better innovation support mechanisms (SMEs), in particular in technological and industrial fields[^84].

**Role of framework condition**

Service innovation platforms can be important to innovation clusters in the Nurturing stage by **connecting government, academia and the industry.** They also help the emerging industries by developing innovation roadmaps that deal with trends, foresights, incubation, access to finance and links to other sectors. Furthermore, they can build a bridge to developments outside of the region through conferences and seminars. They serve as a support framework condition that increases cooperation and sharing[^85].

Existing service innovation platforms for mobile services also specifically aim to support the competitiveness of high growth ventures in the mobile services sector and to strengthen their opportunities for growth and market access both within Europe and in wider international markets. A service innovation platform facilitates access to investors, exploits the potential for business-to-business cooperation, and improves access to large Mobile Corporates as sources of Corporate Partnering and Corporate investors[^86].

Specific objectives of service innovation platforms in mobile services include[^87]:

- **Supporting the evolution of European gazelles in mobile services** by identifying SMEs with high-growth potential and improving their innovation capacity and investment readiness and access to international markets;
- **Fostering all dimensions of innovation** in mobile services;
- **Developing new or better tools for innovation support** by building on successful initiatives.

**Influence of policy makers**

Policy makers should **support the creation of innovation platforms** that aim to accelerate service innovation in the mobile services industries. These initiatives may both be regional and European, as well as global. European wide innovation platforms are more likely to **stimulate cross-border collaboration and knowledge transfer**, which may create additional benefits. Moreover, a number of European service innovation platforms specifically in the field of mobile services are already in place (e.g. EMMA and MOBIP). Policy makers are recommended to take into account that it is often advantageous to **build on successful**


[^87]: [Ibid.](http://www.europe-innova.eu/web/guest/innovation-in-services/kis-innovation-platform/about)
initiatives. Policy makers should therefore stimulate linkages between newly created and existing service innovation platforms.

**South Finland: AppCampus**

AppCampus is a mobile application accelerator program managed by Aalto University in Espoo, Finland. This is an 18 million euro joint investment between Microsoft and Nokia to foster mobile application development on Windows Phone and any other Nokia platform.

To drive innovation and business opportunities in Finland's mobile ecosystem and beyond, Microsoft and Nokia invested 9 million euros each into the “AppCampus” program - a newly established mobile application development program at Aalto University during the next three years starting from spring 2012. The AppCampus program has been set up to foster the creation of innovative mobile applications for the Windows Phone ecosystem, and in addition, Nokia platforms, including Symbian and Series 40, to create a new generation of self-sustaining mobile startups.

Kicked off in May 2012, AppCampus is led and managed by Aalto University, which has a growing reputation as a hotbed of new startup companies. AppCampus is intended to attract thousands of application proposals from students and entrepreneurs from all over the world.

Successful applicants will receive awards varying from 20,000, 50,000 to 70,000 euros, depending on the complexity of the app. In addition, AppCampus also provides training in mobile technology, design and usability, coaching and marketing support. Windows Phone Marketplace and Nokia Store offer local and global business opportunities to program participants via distribution to consumers around the world. AppCampus does not take any equity or commission from the investment. The only requirement is that successful applications are expected to be available exclusively on Windows Phone Store or Nokia Store for the first 90 days.

### 5.6. Dedicated cluster organisation (cluster manager or similar) to coordinate the development of mobile services industries in the region

This support framework condition implies the presence of cluster manager or a similar initiative to coordinate the development of mobile services industries in the region.

**Essence of framework condition**

Cluster initiatives are organised efforts to enhance the competitiveness of a cluster involving private business, public bodies and/or academic institutions within a regional and sectoral system. Cluster initiatives are increasingly managed by specialised organisations, so-called cluster organisations. By a cluster organisation one should understand organised efforts to facilitate cluster development, which can take various forms, ranging from non-profit associations, through public agencies to companies. A cluster organisation typically functions as a mediator between various cluster members and adds value by stimulating collaboration both within the cluster and between the cluster and the outside world.

**Role of framework condition**

Cluster organisations often engage in a wide set of activities, ranging from information provision, commercial cooperation and innovation support, enhancing the business environment, human resources

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88 [http://www.appcampus.fi/about/appcampus](http://www.appcampus.fi/about/appcampus)


upgrading, business development, to cluster expansion. Therefore, cluster organisations are not only promoting networking, they are also providing information about the cluster, lobbying, facilitating collaborative agreements, addressing education and training needs, and promoting the cluster nationally and internationally.

**Influence of policy makers**

Cluster support helps maintain or create employment in regions, and allows firms to be more adaptive and creative in their organisation restructuring efforts. Therefore, regional, national and EU authorities need to offer dedicated cluster policies that typically include grants for cluster management activities and specific collaboration projects. The level of bureaucracy related to application and implementation of cluster policies in the region needs to be minimised (i.e., complicated management procedures; long approval procedures for projects and excessive administrative workload need to be removed).

Since mobile services industry clusters represent highly complex systems with multiple stakeholders involved, cluster policy measures should not be applied on a solely basis. It is rather a combination of various complementary measures that need to be applied simultaneously. Those complementary measures go beyond the scope of cluster policies, and include other fields like education & skills, logistics & infrastructure etc.

Furthermore, at the EU level, in close cooperation with national governments and regions, there is a need to support the efforts of cluster organisations to improve their performance and reach excellence. The relevant initiatives among others refer to the maintenance and update of the repository of training materials as developed by the European Cluster Excellence Initiative and the organisation of further “train-the-trainers” activities for cluster managers. This also holds for the maintenance and update of the information provided by the European Cluster Collaboration Platform. Currently, only two telecommunication clusters are listed on the website, respectively in North Rhine-Westphalia (Germany) and in Oblast Sofiya (Bulgaria). The mobile services industries are not integrated as a separate sector, making it difficult to obtain relevant information of clusters that are active in the mobile services industries.

**Attiki region (Greece): Corallia’s cluster policy**

Corallia Clusters Initiative (Corallia) was the first organisation established in Greece for the structured and systematic management and development of innovation clusters. The aim of the cluster is to develop cohesive and productive innovative ecosystems within which actors operate in a coordinated manner, in specific sectors and regions of the country, and where a competitive advantage and export orientation exists.

Corallia acts as the Cluster Facilitator, which implements specific support actions that involve all innovation ecosystem actors, including industry, universities, research centres, regional and central governmental agencies, venture capital, business angels, banks, infrastructure providers, media, suppliers and buyers, with the aim at boosting competitiveness, entrepreneurship and innovation.

Corallia has developed, and currently supports, the growth of three highly-specialised cluster initiatives in Greece. These cluster initiatives are in knowledge-intensive thematic sectors, namely in nano- and microelectronics-based systems and applications (the mi-Cluster), in nspace technologies and applications (the si-Cluster), and in innovative gaming technologies and creative content (the gi-Cluster).

The cluster boosts an impressive list of distinctions. A selection of distinctions includes:

- HTCI’s cluster development model was recognised as a European best practice by DG Regio (2007);
- The Career Day at the Microelectronics Innovation Center in Maroussi, Athens was distinguished as a “best practice” within the framework of the O.P. "Competitiveness" of the Hellenic Ministry of Development (2007)

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92 The concept of clusters and cluster policies and their role for competitiveness and innovation: Main statistical results and lessons learned. The Commission Staff Working Document, SEC (2008) 2637
94 Vienna Cluster Manifesto: Using Excellent Clusters to Strengthen and Restructure EU Industry, European Cluster Conference 2012, April, Vienna
- Corallia was hailed as a "Best Practice" by DG Enterprise & Industry, within the framework of the European Charter for Small Enterprises 2008, among 151 cases from all over Europe for 2008, in the category "Strengthening the technological capacity of small enterprises" (2009).
- Corallia was mentioned as best practice in the “Investing in our regions” report for the European Commission, DG Regional Policy (2010);
- Corallia’s Roadshows were identified as best practice for enterprises’ internationalisation in the study presented by the European Cluster Alliance entitled “Identifying the main objectives and Activities of Cluster Programmes” (2010);
- Corallia was recognised as best practice in the implementation of European Regional Policy projects (2010).
6. **Growth stage: sustainable industrial growth**

In this chapter, we elaborate on the framework conditions relevant to the development of mobile services industries in the region at the Growth stage, the fourth stage of the industry’s lifecycle. Similar to the previous chapters, we first address each specific framework condition in detail and then discuss the implications for policy makers at this stage of industry’s development.

### 6.1. Introduction

The Growth stage corresponds to the activities that support *marketing, commercial and business development* leading to sustainable industrial growth in the region.

The following framework conditions have been identified as relevant for this stage of industry’s development:

- Vertical integration of cluster actors (market);
- Exploitation of new distribution channels (market);
- Agreements on interface standards (market);
- Collaboration and strategic alignment between network operators and mobile device dealers (cultural);
- Collaboration between mobile service companies and mobile device manufacturers (cultural).

### 6.2. Vertical integration of cluster actors

This *market framework condition* implies the vertical integration of cluster actors in the field of mobile services. This includes both actors from the traditional telecommunication and ICT industries, and actors from the emerging mobile services industries, such as content providers.

**Essence of framework condition**

Vertical integration refers to how value-creating activities, both in the upstream supply system and in the downstream customer relationships, are organised⁹⁶. Vertical integration in the mobile services industry is sometimes associated with a *closed business model where operators show vertical integration of the production and distribution process*. The closed business model is specifically related to the production and distribution process. This makes them both the provider of mobile services and internet access as well as distributor and marketer of user handheld devices⁹⁷.

This type of vertical integration therefore contrasts with the concept of the mobile services industry as an "ecosystem"⁹⁸. However, mobile services companies also work (closely) together with other parts of the value chain, such as content creators. Vertical integration of cluster actors here is therefore not only related to the integrated of production and distribution processed, but *also includes elements of the emerging mobile services industries*, such as the content providers. Moreover, the concept of a closed business model is unlikely to hold if we consider the full value chain of the mobile services industry.

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⁹⁸ Ibid.
Role of framework condition

Vertical integration has only recently been identified in the academic literature as one of the framework conditions that spurs growth in the mobile services industries. Vertically integrated business models have been particularly successful in cases where more advanced mobile data services are likely to be introduced, e.g. after the introduction of respectively the 3G and 4G networks.99

Furthermore, academic research has shown that when comparing the developments of mobile data services in Japan and Europe, differences in adoption rates cannot be (fully) explained by differences in technology, regulatory regimes, cultural differences, internet penetration and differences in consumer segments. Instead, the reason for why Japan was leading was argued to be found in the coordinated and vertically integrated service concepts and revenue models of Japanese operators.100

Mergers and acquisitions of content providers, packagers, distributors and service providers can therefore benefit an innovation cluster in the Growth stage, as organisational boundaries fade even further and the costs of integrating several organisations is outweighed by the growth in revenue the holding manages to achieve. This serves as a market framework condition that improves cooperation and sharing between stakeholders within the industry.101

The concern in current debates, however, is that with vertical integration may give firms both the opportunity (through denial of access or price discrimination) and incentive (increased profit) to restrict competition.102 Antitrust laws and market regulation specifically deal with these issues, but this also poses the question how the two need to be balanced. This is a particularly important aspect to consider in light of the discussions on “net-neutrality”, which limits the options for dominant firms to engage in vertical integration. Empirical evidence, however, that vertical integration or vertical restraints are harmful is suggested to be weak, especially compared to evidence that vertical integration is beneficial. The latter is even suggested to appear in cases where market power is present.103

Influence of policy makers

As follows from the discussion above, the influence policy makers can assert on this framework condition is also related to the influence they have on other framework conditions, mostly those dealing with (de-)regulation. Particularly, policy makers need to walk a fine line between market liberalisation and antitrust on the one hand, and allow for consolidation and vertical integration on the other.

Although evidence for the harmful effects of vertical integration is suggested to be weak, the academic literature does not rule out that vertical integration may have detrimental effects on welfare and innovation. Policy makers therefore need to carefully assess cases of vertical integration on a case-by-case basis.104

Policy makers should, in any case, actively put the benefits of vertical integration at this stage up for discussion. They can set up meetings with key stakeholders in the industry and engage in public consultation with industry. Moreover, if the benefits of further vertical integration are apparent in specific cases, policy makers may help bring these industry players closer together, e.g. by funding collaborative projects or by stimulating active participation in mobile services clusters.

Finally, as this topic touches upon a European interest and European Law, policy makers from the region can engage in discussions with other regions to share their experiences. Moreover, at a European level, discussion

100 Ibid
103 Ibid.
on related aspects, such as “net-neutrality”, can raise awareness for the benefits of particular vertical integration cases.

6.3. **Exploitation of new distribution channels**

This *market framework condition* implies the exploitation of new distribution channels. These new distribution channels are often specific to the new mobile services industries and have revolutionised the way the industries disseminate their new services and products.

**Essence of framework condition**

Distribution channels entail the channels through which firms can offer their products and/or services. While some aspects of the mobile services industries are limited by physical distribution, i.e. the actual mobile devices, emerging aspects of the industry face new opportunities. Instead of physical distribution, many innovative mobile services and products can be offered through digital distribution channels. *The digital distribution channels in particular enable emerging mobile services industries to grow exponentially.*

**Role of framework condition**

*The emergence of new distribution channels has proven to be pivotal in the mobile app market.* Through new distribution channels, specifically digital distribution channels, content creators have been able to bring novel software to the market. This specifically spurred growth of the mobile app market.

Nevertheless, exploitation of new distribution channels can also be observed for physical distribution. Firms, for instance, have come up with new ways to disseminate high end mobile devices. A variety of distribution models exist, including bundling mobile devices with operator subscriptions. Increasingly more operators, however, have started offering “phone leasing”. This distribution strategy allows operators to disseminate expensive high end mobile devices for even lower costs, further increasing market adoption and penetration in this growing market segment\(^{104}\).

Finally, it should be stressed that particularly the *digital distribution channels are of high global nature*. What this means is that channels, such as Apple’s App store or Google’s Play store, are not just present in the region; they enable access to markets all over the world. This significantly expands the market for e.g. mobile app developers, limiting the explicit need for a domestic market for these developers.

**Influence of policy makers**

While the exploitation of new distribution channels can be labelled as one of the key framework conditions for exponential growth in the emerging mobile services industries, *the influence of policy makers is rather limited*. Historically, the innovate distribution channels were developed by industry itself based on a specific need they faced. The mobile app stores are a prime example of this. By acknowledging the global market opportunities for the digital content, and by identifying the limiting factors, a new business model was created\(^{105}\). As the benefits to firms are of such a high scope, the market actually drives innovation here.

Nevertheless, there are a couple of points policy makers can pay attention to. Policy makers can:

- **Raise awareness of new business opportunities**, not only within the region but also outside the region;
- **Ensure a healthy level of competition** that is likely to spur in service innovation;

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• **Support digital distribution channels**, e.g. by ensuring safe access for users, safe mobile payments and exerting confidence in these new distribution channels;

• **Promote new distribution channels** to both mobile services developers and consumers.

Specifics on these policies can be found throughout the report under their respectively related framework conditions.

Apple’s App Store revolutionised the mobile app industry

Although not from the specific regions, Apple’s app store is undoubtedly a key example here. The introduction of Apple’s app store meant a revolution for the mobile app market. Up till then, application and content creators had to deal with many difficulties, such as lack of information, low revenue shares, and regional fragmentation\textsuperscript{106}. In addition, traditional distribution channels needed to establish a great many things with bilateral contracts. As a result, app designers faced long, proprietary and fragmented processes of application certification, approval, targeting and pricing\textsuperscript{107}. Apple’s app store alleviated this problem and provided a critical mass of users both through the introduction of its iPhone and by integrating it in their existing, successful iTunes store. This situation has resulted in a market that is offering new opportunities for both developers and content providers\textsuperscript{108}. Moreover, the developments of the app store underline the high global nature of the new distribution channels.

6.4. Agreements on interface standards

This **market framework condition** implies the presence of agreements on interface standards. This framework condition deals with the variety of technologies that is often developed on the market.

**Essence of framework condition**

Markets that showcase a high level of technology often have to deal with various technology alternatives. This is especially the case if there is a clear market demand for a product or service, but multiple technological solutions to facilitate in this. This framework condition specifically addresses the need for agreements on interface standards. Agreements on standards are needed, as a lack of such standards can ultimately create a dispersed market, hindering or even preventing a critical mass of consumers to form\textsuperscript{109}. Agreements on interface standards thus play a crucial role in the emerging mobile services industries.

**Role of framework condition**

Agreements on interface standards allow innovation generated by the cluster to have an international impact, as well as an impact on adjoining sectors\textsuperscript{110}. Furthermore, the mobile services industries entail indirect network effects. As a result, for continued growth in these industries, the emergence of a critical mass of complementary products such as hardware and software or mobile services and mobile phones is required\textsuperscript{111}.

**Creating a critical mass of complementary products requires agreements on standards.** Standards had to be set in a wide variety of related ICT industries, and agreements on these standards were necessary before a critical mass of hardware and software could emerge. Concerning mobile services industries


in specific, Scandinavia for example experienced faster growth in mobile phone usage than other countries because government sponsored organizations created, among other things, open standards. These standards allowed domestic and foreign manufacturers to sell, as opposed to rent, phones faster than firms in other countries did\textsuperscript{112}.

Furthermore, most Western European countries experienced faster growth in digital phones than e.g. the U.S. because they agreed on a single standard at an earlier stage. As a result, they began licensing new entrants in the late 1980s long before the U.S. did in 1995\textsuperscript{113}.

**Influence of policy makers**

Governments have played an important role in promoting many of the agreements on standards\textsuperscript{114}. They have facilitated agreements on standards, which in turn provided a basis for mobile services to build upon an acquire critical mass.

**Policy makers then should first of all promote agreements on (interface) standards in the industries.** The empirical literature has shown the clear benefits that accrue from setting such standards. Policy makers can promote these agreements by engaging in discussions with multiple stakeholders. By setting up stakeholder meetings or joint sessions on interoperability of devices and components, both industry and policy makers, as well as academia can come together to discuss the way forward. Moreover, these discussions provide valuable information to industry on the direction policy makers intend to take, increasing transparency on (changes in) regulation.

However, stating that policy makers need to promote agreements on standards is hardly a surprising recommendation. It is, however, of crucial importance to consider when such agreements need to be promoted. European countries, compared to the U.S., have been slightly faster to set standards and aggressive time-tables for e.g. the changeover from analog to digital broadcasting. This also led to earlier industry formation in Europe\textsuperscript{115}. By engaging in discussions and by agreeing on standards in an early stage, a competitive advantage can be gained on other countries or regions. Moreover, early agreements on standards prevent companies from investing heavily in alternatives, from which in the end they are unlikely to reap the benefits due to a lack of a critical mass in consumers.

**6.5. Collaboration and strategic alignment between network operators and mobile device dealers**

This cultural framework condition implies collaboration and strategic alignment between network operators and mobile device dealers.

**Essence of framework condition**

Mobile services clusters in the Growth stage benefit from good cooperation and strategic alignment between network operators and mobile device dealers. In essence, collaboration between both types of stakeholders works both ways. Mobile device dealers gain more knowledge on the technical capabilities of the network, which provides them a platform to develop new mobile services for. Network operators, on the other hand, gain more knowledge on e.g. demand for certain technologies and on whether their network can handle e.g. the assigned mobile traffic without abundant spare capacity. Strategic alignment, in turn, ensures that both types of stakeholders share a common interest.


\textsuperscript{113} Ibid.

\textsuperscript{114} Ibid.

\textsuperscript{115} Ibid.
Role of framework condition

Having both collaboration and strategic alignment between network operators and mobile device dealers, creates a clear common interest between the two different stakeholder groups. It allows them to share valuable information with each other, which can form the basis for more service innovation and investments in (new) mobile technologies. This can, for example, lead to networks that handle the assigned mobile traffic without abundant spare capacity, which in turn increases the chances of successful market uptake of mobile services.

Moreover, as network capacity is becoming an increasingly more serious problem, it is suggested that industry players need to actively collaborate on e.g. application design, device platforms and feature activations. This framework condition thus increases cooperation and sharing among stakeholders within the industry.

Influence of policy makers

Policy makers should facilitate interaction between network operators and mobile device dealers. There are various channels through which this can be achieved, which have also been discussed at length in this case study. Summarising, policy makers can:

- **Stimulate discussions** between the different stakeholders groups by e.g. setting up meetings between operators and dealers;
- **Stimulate strategic alignment** by funding projects of common interest, in which the various groups of stakeholders participate;
- **Promote an agreement on standards** in which both stakeholder groups have a strategic interest (this would further stimulate a strategic alliance);
- **Support cluster initiatives** to facilitate further discussions and collaboration between both stakeholder groups.

6.6. Collaboration between mobile service companies and mobile device manufacturers

This cultural framework condition implies collaboration between mobile service companies on the one hand and mobile device manufacturers on the other.

Essence of framework condition

Mobile services clusters in the Growth stage also benefit from good collaboration between mobile service companies and mobile device manufacturers. An alignment of their product and service offerings leads to increased chances of successful market uptake of mobile services (the collaboration of TomTom and Apple is a recent and successful example of this). Their collaboration serves as a cultural framework condition that increases cooperation and sharing among stakeholders within the industry.

Role of framework condition

Collaboration between mobile service companies and mobile device manufacturers has a number of clear advantages. For one, such a collaboration ensures that new mobile services can not only be tested on the next generation of mobile devices before they are even brought to the market, but it also gives mobile services

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companies strategic insight into upcoming device features. Vice versa, mobile device manufacturers gain insight in the demand for specific features, allowing them to better focus on features that add value to customers and, as a result, to their business. Furthermore, collaboration between these groups of stakeholders often allows them to identify co-marketing opportunities and launch platforms for new products. This leads to increased chances of successful market uptake of new mobile services and spurs mobile service innovation.

Influence of policy makers

Similar to the framework condition listed under section 6.5, policy makers should facilitate interaction between the various groups of stakeholders. Summarising, policy makers can:

- **Stimulate discussions** between the different stakeholders groups by e.g. setting up meetings between operators and dealers;

- **Stimulate strategic alignment** by funding projects of common interest, in which the various groups of stakeholders participate. Projects that require both service innovation and technical innovation can lead to new mobile services, spurring growth in the mobile services industries;

- **Promote an agreement on standards** in which both stakeholder groups have a strategic interest (this would further stimulate a strategic alliance);

- **Support cluster initiatives** to facilitate further discussions and collaboration between both stakeholder groups.

These suggestions have been further detailed throughout the report.
7. **Survey on industry specific framework conditions**

This chapter presents and discusses the survey responses amongst stakeholders with a helicopter view on the emergence of mobile services industries in the region.

Whereas in the previous chapters we have discussed relevant framework conditions for industry emergence, the objective of this analysis is to develop a snapshot picture of the presence of the analysed framework conditions in mobile services industries. Such an analysis enables policy makers to assess gaps between relevant framework conditions and the presence of these conditions in the region.

The data for the analysis has been collected by means of an online survey amongst 21 stakeholders within the regions of Vienna (5), South Finland (8) and Attiki (8). The collected data was used for comparisons between regions within one industry category (cross-regional). The survey results were analysed and compared across and between the regions. As a result the mobile services industries represented in the survey can be characterised by the relative presence of framework conditions.

### 7.1. Cross-regional comparison of general framework conditions

The chosen method for analysing and comparing the presence of framework conditions in the regions was performed per category of framework conditions. In order to compare the responses across the regions, we first averaged the results per individual framework condition and subsequently averaged the results per type of framework condition. This computation was performed at the regional level. Figure 7-1 presents the results as a spider diagram.

**FIGURE 7-1:** Presence of framework conditions in the selected regions for mobile services industries

![Spider diagram showing the presence of framework conditions in Vienna (AT), South Finland (FI), and Attiki (GR), with an average line for comparison.](image)
As follows from the results, a substantial difference in perception among the presence of framework conditions can be observed across the regions. Generally speaking, the knowledge, regulatory and industrial framework conditions are valued highly. Nevertheless, clear differences can be observed across the regions. Aside from level differences, however, the shapes of the spider diagrams are rather consistent. This implies that stakeholders in all of the selected regions observe, on average, a similar pattern regardless of the actual levels.

To gain more insight in the survey results, Table 7-1 provides the mean values for each type of framework condition for every region. The absolute values confirm the spread between regions, with South Finland generally showing the highest overall presence of framework conditions and Attiki respectively the lowest. Moreover, within all regions, the Regulatory and Knowledge type of framework conditions clearly showcase the highest average values, followed by Industrial, Market and Cultural type of framework conditions.

TABLE 7-1: Mean values for framework conditions per region

<table>
<thead>
<tr>
<th>Type of framework condition</th>
<th>Vienna (AT)</th>
<th>South Finland (FI)</th>
<th>Attiki (GR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial</td>
<td>5.53</td>
<td>5.87</td>
<td>5.47</td>
</tr>
<tr>
<td>Industrial</td>
<td>7.20</td>
<td>5.50</td>
<td>5.80</td>
</tr>
<tr>
<td>Market</td>
<td>6.93</td>
<td>5.87</td>
<td>5.60</td>
</tr>
<tr>
<td>Cultural</td>
<td>8.00</td>
<td>6.20</td>
<td>5.80</td>
</tr>
<tr>
<td>Knowledge</td>
<td>7.10</td>
<td>6.50</td>
<td>6.60</td>
</tr>
<tr>
<td>Regulatory</td>
<td>6.85</td>
<td>5.60</td>
<td>5.65</td>
</tr>
<tr>
<td>Support</td>
<td>7.00</td>
<td>7.10</td>
<td>5.95</td>
</tr>
</tbody>
</table>

Regional observations

On the basis of the results discussed above, a number of observations can also be made with regard to the specific regions. Each region showcases a (slightly) different pattern in the presence of framework conditions, which is further explored below.

The results from the Vienna region hardly differ from the industry average. Nevertheless, the presence of the type of framework conditions in the Vienna region appears to be more balanced. This is in particular noticeable in the knowledge framework conditions and support framework conditions, which are perceived to be respectively less and more present in the Vienna region than on average in the analysed regions. While the knowledge type of framework condition also shows a large relevant presence in the region, the regulatory type of framework conditions are on average perceived to be spread most widely in the Vienna region. Moreover, the market framework conditions showcased on average a relatively high presence in the region. Overall, the framework conditions that are perceived to be most present in the Vienna region are the regulatory, knowledge and market framework conditions.

Stakeholders in the South Finland region perceive a relatively high presence of the knowledge, regulatory and industrial framework conditions. This is closely followed by a perceived presence of the financial and cultural framework conditions. The support and market framework conditions were perceived to be present in the region to a lesser extent. Compared to the industry average, it can immediately be observed that stakeholders in the region perceive all framework conditions to be present to a higher degree. Especially the presence of the financial framework conditions is noteworthy, as we have generally observed a lack of presence here across all industries and regions. With the exception of the financial and industrial framework conditions, however, we find a comparable presence of framework conditions. The South Finland region is therefore best characterised by a relatively high presence of knowledge, regulatory and industrial framework conditions, followed by the presence of financial, cultural, market and support framework conditions.
Similar to the other selected regions for the mobile services industries, we observe a relatively high presence of the knowledge and regulatory framework conditions in the Attiki region. Moreover, the Attiki region shows a relatively high presence of the cultural and market framework. Contrasting with our findings for the earlier regions, the industrial framework conditions are perceived to have relatively little presence in the region. Moreover, both the financial and support framework conditions lack presence in the region according to the stakeholders. The Attiki region on itself can best be characterised as having a **relatively high presence in knowledge, cultural, market and regulatory framework conditions**. The industrial, financial and support framework conditions, in contrast, relatively lack presence in the region.

### 7.2. Industry specific framework conditions

Underlying the general framework condition categories are a set of industry specific sub-level framework conditions. To get a better grasp of the presence of these industry specific framework conditions, it is worthwhile to consider the results of each of these conditions in more detail. Table 7-2 presents the detailed summary statistics of the survey responses for each of the sub-level framework conditions across the regions.

TABLE 7-2: Detailed summary statistics of survey responses for the mobile services industries

<table>
<thead>
<tr>
<th>Framework conditions</th>
<th>n</th>
<th>Mean</th>
<th>Std. dev.</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. Financial framework conditions</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Investments in next generation technology and networks</td>
<td>21</td>
<td>6.57</td>
<td>1.72</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>- Availability of seed and venture capital for mobile services companies</td>
<td>21</td>
<td>5.48</td>
<td>2.54</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td><strong>2. Industrial framework conditions</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Existing prominent ICT equipment industry</td>
<td>21</td>
<td>5.52</td>
<td>2.64</td>
<td>2</td>
<td>10</td>
</tr>
<tr>
<td>- Critical mass of mobile services companies</td>
<td>21</td>
<td>7.67</td>
<td>1.71</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td><strong>3. Market framework conditions</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Multi-operator market structure</td>
<td>21</td>
<td>7.48</td>
<td>2.32</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>- Critical mass of consumers with demand for high end devices with wide application areas</td>
<td>21</td>
<td>7.19</td>
<td>1.78</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>- Agreements on interface standards</td>
<td>21</td>
<td>6.33</td>
<td>1.98</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>- Vertical integration of cluster actors</td>
<td>21</td>
<td>5.67</td>
<td>1.96</td>
<td>2</td>
<td>9</td>
</tr>
<tr>
<td>- Exploitation of new distribution channels</td>
<td>21</td>
<td>6.05</td>
<td>1.28</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td><strong>4. Cultural framework conditions</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Collaboration between regulators and operators</td>
<td>21</td>
<td>6.43</td>
<td>1.86</td>
<td>3</td>
<td>9</td>
</tr>
<tr>
<td>- Collaboration between mobile service companies and mobile device manufacturers</td>
<td>21</td>
<td>6.71</td>
<td>2.03</td>
<td>3</td>
<td>10</td>
</tr>
<tr>
<td>- Collaboration and strategic alignment between network operators and mobile device dealers</td>
<td>21</td>
<td>7.05</td>
<td>1.66</td>
<td>4</td>
<td>10</td>
</tr>
<tr>
<td><strong>5. Knowledge framework conditions</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Critical mass of Science and Technology Researchers</td>
<td>21</td>
<td>8.00</td>
<td>1.52</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td><strong>6. Regulatory framework conditions</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Mobile market liberalisation</td>
<td>21</td>
<td>7.86</td>
<td>2.01</td>
<td>3</td>
<td>10</td>
</tr>
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<td>- Policy measures promoting entrepreneurship in mobile services industries</td>
<td>21</td>
<td>6.95</td>
<td>1.75</td>
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<tr>
<td>- Policy measures supporting internationalisation in mobile services industries</td>
<td>21</td>
<td>6.81</td>
<td>1.86</td>
<td>2</td>
<td>10</td>
</tr>
</tbody>
</table>

For this analysis we have chosen to aggregate the results as this increases the explanatory power by having more observations available to us.
What follows from Table 7-2 is that the framework conditions related to the specific industry characteristics showcase a relatively higher presence in the regions. Stakeholders noted a relatively high presence of a critical mass of mobile services companies, but also of consumers with a demand for high-end mobile devices. Moreover, regions noted to exhibit a multi-operator market structure, which unsurprisingly coincides with a relatively high presence of mobile market liberalisation in the regions.

With respect to the financial framework conditions, it can be observed that stakeholders note a relatively high presence in investments in next-generation technology and networks. Especially the latter is evidenced in the regions by the new mobile networks (4G) that are being rolled out. However, companies note that there is a relative lack of seed and venture capital available to mobile services companies, which makes it more difficult for mobile services companies to keep up with the high investments that are required.

Finally, the regions on average are suggested to lack presence of both a platform to promote service innovation in the area, and presence of a dedicated cluster organisation. While both the South Finland and Vienna regions are home to an IT cluster, dedicated mobile services cluster organisations are not as present in the regions. Complementary to this, however, stakeholders noted a relatively high presence of policy measures promoting entrepreneurship and internationalisation in the mobile services industries.
8. Conclusions and policy recommendations

In the current chapter, we elaborate on specific recommendations with regard to how policy makers can support the development of mobile services industries in European regions at each stage of industry’s development. We begin by mapping the identified framework conditions based on the stage of industry’s development these framework conditions refer to.

8.1. Mapping of identified framework conditions

The current case study analysis was built on the notion of the dynamic nature of emerging industries, i.e., a continuous evolution of an industry and its periodical transitions from one stage to another. The analysis confirmed that the role and importance of the relevant framework conditions changes with new stages of the industry’s life cycle. However, all identified framework conditions prove to have a long-term impact and are relevant for more than one stage. Figure 8-1 presents the result of the mapping exercise of the analysed framework conditions for mobile services industries.

FIGURE 8-1: Mapping of identified framework conditions for mobile services industries
8.2. Policy recommendations

In this sub-section, we elaborate on specific recommendations for regional, and, whenever relevant, national and EU policy makers on how to support the development of mobile services industries in European regions. We continue building on the dynamic approach forming the core of our methodology, and tailor the relevant supporting measures to the specific stages of the industry’s life cycle. In all cases, the proposed measures are relevant for more than one stage, which is specified in the description of the measures below.

Policy recommendations for Precursor stage

The Precursor stage is the first stage in the industry’s lifecycle implying the first interest in the emerging industry in the region. While in practice, the first initiatives introducing mobile services industries to the region often come from the private sector, the role of policy makers at this initial stage should not be underestimated. Policy makers can stimulate the development of mobile services industries at the Precursor stage in the following ways:

1) Existing prominent ICT (equipment) industry:
   a) Prominent ICT (equipment) industry is more likely to settle in a region that is more attractive to them. Policy makers can aim to increase the attractiveness of the region for this type of industry.
   b) There are various ways in which policy makers can help raise the attractiveness of the region, which include stimulating and ensuring presence of skilled labour, (venture) capital, high quality educational and research institutions, and high levels of R&D investments in the region.
   c) Policy makers may give (prominent) ICT companies an incentive to settle in the region by offering government funding, e.g. grants or subsidies, to new entrants.

2) Multi-operator market structure:
   a) If there is no multi-operator market structure in place, policy makers need to create such a market structure. Both de-monopolisation of the market and unbundling of industries are relevant policy instruments, as well as privatisation of State Owned Enterprises (SOEs).
   b) If a multi-operator market structure is already in place, policy makers need to sustain this type of market structure. By putting a regulator in place that oversees competition on the market as well as takes the desired market structure into account, a multi-operator market can be sustained. For example, a National Competition Authority may be empowered to assess mergers and acquisitions, ensuring that the local market is exposed to ample competitive pressure.

3) Critical mass of consumers with demand for high end devices with wide application areas:
   a) Policy makers can stimulate the creation of a critical mass of consumers by stimulating the demand for high end mobile devices.
   b) Examples of measures stimulating the demand include (pre-commercial) public procurement and making services available for high end mobile devices, such as providing citizens a mobile portal for various public services.

4) Critical mass of Science and Technology Researchers:
   a) Regional stakeholders need to highlight the attractiveness of the region in order to attract highly skilled researchers. They should also create awareness for both the region as a place to live and as an innovative hotspot.
   b) Policy makers should promote education and careers in the ICT and mobile services industries in the region.
   c) Graduates need to be stimulated to take up research positions in the field of Science and Technology. By actively promoting and stimulating education and careers in these industries, more highly skilled human capital becomes available over time.
d) It is crucial for policy makers to understand that critical career decisions are being made already more than a decade before a student enters the workforce. Policy makers should therefore promote education and careers in high tech fields already at the pre-vocational and vocational level.

e) There is also a need to offer children early technical education programmes that broaden their choice and development opportunities. These programmes need to motivate children to want to learn more, transmit the excitement of science investigation and engineering innovation, and provide teachers with the appropriate tools to facilitate the learning process.

5) **Mobile market liberalisation:**
   a) Policy makers should stimulate a multi-operator market structure in the region.
   b) By deregulating the mobile services market, other firms can enter the market. This is specifically possible if market entry and expansion faces limited regulation, and if existing market actors face limited to no protection from the authorities.
   c) In order to facilitate a multi-operator market structure, policy makers can de-monopolise existing telecommunications industries, unbundle vertically integrated actors on the markets and liberalise competitive segments.
   d) An independent regulator should be introduced for making the transition from monopoly to market and to ensure a level playing field for market participants.

6) **Investments in next generation technology and networks:**
   a) Policy makers should provide incentives to private companies to invest in next generation technologies and networks, e.g. by providing subsidies, giving out preferential loans or by guaranteeing loans.
   b) Policy makers should provide direct government investments, e.g. to stimulate internet penetration within the region or by directly investing in next generation data networks.

**Policy recommendations for Embryonic stage**

The Embryonic stage is the second stage in the industry’s lifecycle implying the activities that support the improvement of the reliability and performance of technology and services to a point where it can be demonstrated in a market environment. Specifically, this stage implies activities that help to demonstrate the commercial potential of technology and services in the region through revenue generation. Policy makers can stimulate the development of mobile services industries by ensuring:

1) **Availability of seed and venture capital for mobile services companies:**
   a) By providing targeted and increased support to the industry from EU Community Budget, the European Investment Fund and European Investment Bank, private investments could be triggered.
   b) This support from EU government bodies can take the form of providing a package of financial instruments to cover different company sizes and structures (e.g., loans, guarantees, grants and tax incentives) aimed at increasing the attractiveness for the private sector to invest in European mobile service industry product development activities.

2) **Policy measures promoting entrepreneurship in mobile services industries:**
   a) Policy makers should stimulate public-private partnerships focused on innovation, specifically in the field of telecommunications and mobile services. Public-private partnerships in mobile technology and mobile services are more likely to result in new solutions, characterising the emerging mobile services industries.
   b) Policy makers should provide government-backed vouchers for innovation support. These vouchers can positively influence the entrepreneurial climate in a cluster.
   c) Moreover, policy makers need to stimulate the creation of service innovation and promotion platforms. These platforms both stimulate service innovation and bring attention to the new mobile services industries.
   d) Policy makers need to stimulate the creation of Working Groups to discuss goals, ambitions and future policy actions for the ICT and mobile services industries. Research and discussions resulting from these
Working Groups can be used to formulate ambitions, policy goals and establish a roadmap for mobile service innovation.

The abovementioned policy actions are relevant also for the next two stages of industry's development: Nurture and Growth stage.

**Policy recommendations for Nurture stage**

The Nurture stage corresponds to the activities that help to improve the price and performance of applications to a point where sustainable business potential can be demonstrated. Specifically, this stage implies developing a market with mass growth potential. Also at the Nurture stage, the role of policy makers is of fundamental importance. Policy makers can stimulate the development of mobile services industries at this stage by ensuring/supporting the presence of:

1) **Critical mass of mobile services:**
   a) The key task of policy makers is to create an environment favourable for setting up and expanding businesses in the region.
   b) Policy makers should therefore promote the concept of mobile services industries in the region (e.g., social marketing and advertising campaigns promoting mobile services industries, new mobile technologies and applications in the region, as well as incentivising the purchase of high end mobile devices to allow for new mobile services).
   c) Policy makers also need to promote entrepreneurship in the mobile services industries;
   d) Policy makers should stimulate public-private partnerships. Public-private partnerships boost innovation in the region and advances technological progress.
   e) Policy makers need to simplify access to finance for mobile services companies.
   f) Programmes that support SME growth (financial support; training and coaching) need to be introduced to the region.

2) **Collaboration between regulators and operators:**
   a) Regulators must work together with operators to lower the cost of ownership of the networks, ultimately driving down the costs of mobile phones and mobile services.
   b) Policy makers should actively stimulate collaboration between regulators and operators. This can for instance be facilitated by setting up joint meetings between operators and regulators to discuss current issues and new regulation.
   c) Policy makers need to support platforms and associations that specifically aim to stimulate discussion between operators and regulators.

3) **Policy measures supporting internationalisation in mobile services industries:**
   a) To stimulate internationalisation of local incumbents, regional and national policy makers can employ “National Champion”-policies. As these champions face low risk on the domestic market, they have an incentive to expand aggressively on international markets.
   b) For the mobile services industries raising awareness, supporting the financial needs of internationalisation, supporting the internationalisation of services and stimulating cross-border cooperation have been of high importance. Policy makers, therefore, should pay close attention to these areas and introduce supporting policies.
   c) Regional, national and EU authorities should stimulate cross-border collaboration by setting up European wide projects with a common goal. Such cross-border collaboration helps domestic firms to gain access to international markets.

4) **Presence of a platform to promote service innovation in the area:**
   a) Policy makers should support the creation of innovation platforms that aim to accelerate service innovation in the mobile services industries. European wide innovation platforms are more likely to stimulate cross-border collaboration and knowledge transfer, which may create additional benefits.
b) Policy makers are recommended to take into account that it is often advantageous to build on successful initiatives. They should therefore stimulate linkages between newly created and existing service innovation platforms. A number of European service innovation platforms specifically in the field of mobile services are already in place (e.g. EMMA and MOBIP) and need to be taken into account.

5) Dedicated cluster organisation:
   a) Regional, national and EU authorities need to offer dedicated cluster policies that typically include grants for cluster management activities and specific collaboration projects.
   b) The level of bureaucracy related to application and implementation of cluster policies in the region needs to be minimised (i.e., complicated management procedures; long approval procedures for projects and excessive administrative workload need to be removed).
   c) Since mobile services industry clusters represent highly complex systems with multiple stakeholders from multiple related industries involved, cluster policy measures should not be applied on a solely basis. It is rather a combination of various complementary measures that need to be applied simultaneously (e.g., education & skills, logistics & infrastructure etc.).
   d) At the EU level, in close cooperation with national governments and regions, there is a need to support the efforts of cluster organisations to improve their performance and reach excellence (e.g., European Cluster Excellence Initiative and the organisation of further “train-the-trainers” activities for cluster managers).

The abovementioned policy actions are relevant also for the next two stages of industry’s development: Nurture and Growth stage.

Policy recommendations for Growth stage

Finally, besides the measures already mentioned above, the key measures to be taken by policy makers at the Growth stage are:

1) Vertical integration of cluster actors:
   a) Policy makers therefore need to carefully assess cases of vertical integration on a case-by-case basis to prevent detrimental effects on welfare and innovation, even though evidence for the harmful effects of vertical integration is suggested to be weak.
   b) Policy makers should actively put the benefits of vertical integration in the growth stage up for discussion. They can set up meetings with key stakeholders in the industry and engage in public consultation with industry.
   c) Policy makers may help bring industry players closer together to stimulate vertical integration, e.g. by funding collaborative projects or by stimulating active participation in mobile services clusters.
   d) Policy makers from the region can engage in discussions with other regions to share their experiences with vertical integration in the domestic market. Moreover, at a European level, discussion on related aspects, such as “net-neutrality”, can raise awareness for the benefits of particular vertical integration cases.

2) Exploitation of new distribution channels:
   a) Regional, national and EU authorities can raise awareness of new business opportunities, not only within the regions but also outside the regions.
   b) Regulators need to ensure existence of competitive pressure on the market that is likely to spur in service innovation.
   c) Policy makers should support and promote new (digital) distribution channels, e.g. by ensuring safe access for users, safe mobile payments and exerting confidence in these new distribution channels.

3) Agreements on interface standards:
   a) Regional, national and EU authorities need to be aggressive in setting interface standards. European countries, compared to the U.S., have been slightly faster to set standards and aggressive time-tables
for e.g. the changeover from analogue to digital broadcasting. This also led to earlier industry formation in Europe. Europe needs to continue this trend to gain a competitive advantage.

4) Collaboration and strategic alignment between network operators and mobile device dealers:
   a) Policy makers should stimulate discussions between the different stakeholders groups by e.g. setting up meetings between operators and dealers.
   b) Policy makers, at the regional, national and EU level, should stimulate strategic alignment by funding projects of common interest, in which the various groups of stakeholders participate.
   c) Policy makers should promote an agreement on standards in which both stakeholder groups have a strategic interest. This would further stimulate a strategic alliance.
   d) Policy makers need to support cluster initiatives to facilitate further discussions and collaboration between both stakeholder groups.

5) Collaboration between mobile service companies and mobile device manufacturers:
   a) Policy makers should stimulate discussions between the different stakeholders groups by e.g. setting up meetings between mobile services companies and mobile device manufacturers;
   b) Policy makers, at the regional, national and EU level, should stimulate strategic alignment by funding projects of common interest, in which the various groups of stakeholders participate. Projects that require both service innovation and technical innovation can lead to new mobile services, spurring growth in the mobile services industries;
   c) Policy makers should promote an agreement on standards in which both stakeholder groups have a strategic interest. This would further stimulate a strategic alliance.
   d) Policy makers need to support cluster initiatives to facilitate further discussions and collaboration between both stakeholder groups.

Concluding remarks

The current case study analysis has shown that policy makers play a vital role in the development of mobile services industries from the very beginning of industry’s emergence in the region. However, as mentioned before, mobile services industry clusters represent highly complex phenomena consisting of multiple other stakeholder groups besides policy makers (i.e., small and large firms from both core and connected industries; academic institutions; various supporting structures including cluster organisations; investors etc.). All these stakeholder groups are crucial for the development of mobile services industries in the region. Nevertheless, while favourable policy measures cannot solve all the challenges on their own, their presence can significantly accelerate the development of mobile services industry clusters.

There is no generic ‘silver bullet’ across all mobile services industry clusters in terms of policy measures that have to be applied. The list of measures above provides a general overview of the relevant measures that are reported to be favourable for the development of mobile services industries. However, what works in one region does not necessarily have to work in another one, as myriads of contextual factors (including historical, economic, demographic, cultural and other developments) determine the success of the applied policy measures. In this respect, policy makers and cluster organisations play a particularly fundamental role. It is crucial to make sure that the specific activities of cluster initiatives are aligned with the unique set of challenges and opportunities the cluster is facing. **The critical task is to ensure that policy interventions first support an effective process of identifying the action priorities and then provide the right tools to address whatever those priorities are.** Examples of such priorities include specific business environment dimensions to upgrade, the need to address specific weaknesses in company development, specific market opportunities to leverage through collaboration etc.\(^{119}\).

Finally, policy interventions supporting industry development should always be discussed with local companies, and designed in a way that captures the interest of those companies. Consequently, industry’s involvement in policy making is crucial from the very early stages, including the design stage of a policy intervention (joint objective setting), but also its monitoring and evaluation.
Annex A: Survey questionnaire

Introduction

Welcome to the online survey on the industry-specific framework conditions for the world-class clusters in emerging industries. Framework conditions here refer to factors that are vital for cluster development.

The survey aims to collect inputs for the evidence-based policy recommendations that would allow regional, national and European policy makers to develop effective measures in order to create, expand and keep the European clusters in emerging industries competitive.

The survey is conducted in the context of the “Extension of the European Cluster Observatory: Promoting better policies to develop world-class clusters in Europe” carried out by PwC for Enterprise and Industry Directorate General of the European Commission.

We highly appreciate your participation and we would like to thank you in advance for your time and inputs.

Please click on the “Next” button to start the survey.

1 General information

<table>
<thead>
<tr>
<th>Item</th>
<th>Response</th>
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<tbody>
<tr>
<td>1.1 First Name</td>
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<td>1.2 Last Name</td>
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<td>1.4 Organisation</td>
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<tr>
<td>1.5 Type of stakeholder</td>
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<td></td>
<td>• Policy maker (regional/national)</td>
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<td>• Industry association</td>
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<td></td>
<td>• Chamber of commerce or similar</td>
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<td>• Other (please specify)</td>
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</tbody>
</table>

1.6 Please indicate the industry you represent.

Options (drop down menu)

Creative industries
Eco-industries
Mobile services industries

1.7 Please indicate the region you represent.

Options (drop down menu)

Vienna (Austria)
South Finland
Attiki (Greece)

The remainder of the survey focuses on seven types of framework conditions in your region: (1) financial; (2) industrial; (3) market; (4) cultural; (5) knowledge; (6) regulatory and policy; and (7) support.

2 Financial framework conditions
Please indicate to what extent the following financial framework conditions are applicable to your region (1 = the condition is hardly applicable to the region; 5 = the condition is to some extent applicable to the region; and 10 = the condition is highly applicable to the region).

### 2.1 Availability of government funding for large-scale demonstration projects with active user involvement (e.g., international R&D cooperation projects; user-heavy demonstration projects)

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</table>

### 2.2 If relevant, please provide an example of a good practice from your region (i.e., specific tools, programmes, measures etc. that aim to support this framework condition).

[open question]

### 2.3 Investments in next generation technology and networks (e.g., Internet penetration; ISDN networks; next generation mobile networks (2G, 3G, 4G))

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### 2.4 If relevant, please provide an example of a good practice from your region (i.e., specific tools, programmes, measures etc. that aim to support this framework condition).

[open question]

### 2.5 Availability of seed and venture capital for mobile services companies

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### 2.6 If relevant, please provide an example of a good practice from your region (i.e., specific tools, programmes, measures etc. that aim to support this framework condition).

[open question]

### 3 Industrial framework conditions

Please indicate to what extent the following industrial framework conditions are applicable to your region (1 = the condition is hardly applicable to the region; 5 = the condition is to some extent applicable to the region; and 10 = the condition is highly applicable to the region).

### 3.1 Existing prominent ICT equipment industry (e.g. ICT equipment manufacturers and distributors have established in the area; these companies make up a significant share of the regional economy)

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### 3.2 If relevant, please provide an example of a good practice from your region (i.e., specific tools, programmes, measures etc. that aim to support this framework condition).

[open question]

### 3.3 Critical mass of mobile services companies

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### 3.4 If relevant, please provide an example of a good practice from your region (i.e., specific tools, programmes, measures etc. that aim to support this framework condition).

[open question]
### 4 Market framework conditions

Please indicate to what extent the following market framework condition is applicable to your region (1 = the condition is hardly applicable to the region; 5 = the condition is to some extent applicable to the region; and 10 = the condition is highly applicable to the region).

#### 4.1 Multi-operator market structure

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#### 4.2 If relevant, please provide an example of a good practice from your region (i.e., specific tools, programmes, measures etc. that aim to support this framework condition).

[open question]

#### 4.3 Critical mass of consumers with demand for high end devices with wide application areas

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#### 4.4 If relevant, please provide an example of a good practice from your region (i.e., specific tools, programmes, measures etc. that aim to support this framework condition).

[open question]

#### 4.5 Agreements on interface standards (e.g. meetings of stakeholders to agree on interface standards; documents detailing interface standards)

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#### 4.6 If relevant, please provide an example of a good practice from your region (i.e., specific tools, programmes, measures etc. that aim to support this framework condition).

[open question]

#### 4.7 Vertical integration of cluster actors (e.g. mergers and acquisitions concerning content providers, packagers, distributors and service providers; mergers and acquisitions concerning business consultants, IT integrators and new media)

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#### 4.8 If relevant, please provide an example of a good practice from your region (i.e., specific tools, programmes, measures etc. that aim to support this framework condition).

[open question]

#### 4.9 Exploitation of new distribution channels (e.g. App Store)

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#### 4.10 If relevant, please provide an example of a good practice from your region (i.e., specific tools, programmes, measures etc. that aim to support this framework condition).

[open question]
5 Cultural framework conditions

Please indicate to what extent the following cultural framework conditions are applicable to your region (1 = the condition is hardly applicable to the region; 5 = the condition is to some extent applicable to the region; and 10 = the condition is highly applicable to the region).

5.1 Collaboration between regulators and operators (i.e. regulations that encourage development and market adoption; meetings or joint sessions between regulators and operators)

5.2 If relevant, please provide an example of a good practice from your region (i.e., specific tools, programmes, measures etc. that aim to support this framework condition).

5.3 Collaboration between mobile service companies and mobile device manufacturers (e.g. stakeholder meetings or joint sessions on interoperability of devices and components)

5.4 If relevant, please provide an example of a good practice from your region (i.e., specific tools, programmes, measures etc. that aim to support this framework condition).

5.5 Collaboration and strategic alignment between network operators and mobile device dealers (e.g., networks that handle assigned mobile traffic without abundant spare capacity; meetings between operators and dealers or joint sessions to increase strategic alignment)

5.6 If relevant, please provide an example of a good practice from your region (i.e., specific tools, programmes, measures etc. that aim to support this framework condition).

6 Knowledge framework conditions

Please indicate to what extent the following knowledge framework conditions are applicable to your region (1 = the condition is hardly applicable to the region; 5 = the condition is to some extent applicable to the region; and 10 = the condition is highly applicable to the region).

6.1 Critical mass of Science and Technology Researchers

6.2 If relevant, please provide an example of a good practice from your region (i.e., specific tools, programmes, measures etc. that aim to support this framework condition).

6.3 Critical mass of talented and qualified ICT engineers
6.4 If relevant, please provide an example of a good practice from your region (i.e., specific tools, programmes, measures etc. that aim to support this framework condition).
[open question]

7 Regulatory and policy framework conditions

Please indicate to what extent the following regulatory and policy framework conditions are applicable to your region (1 = the condition is hardly applicable to the region; 5 = the condition is to some extent applicable to the region; and 10 = the condition is highly applicable to the region).

7.1 Mobile market liberalisation i.e. limited regulation on market entry and expansion; limited to no protection for existing market actors

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7.2 If relevant, please provide an example of a good practice from your region (i.e., specific tools, programmes, measures etc.).
[open question]

7.3 Policy measures promoting entrepreneurship in mobile services industries

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7.4 If relevant, please provide an example of a good practice from your region (i.e., specific tools, programmes, measures etc.).
[open question]

7.5 Policy measures supporting internationalisation in mobile services industries (e.g., funding creative cross-border events; industry-to-industry dialogue; scouting missions; market intelligence; collective representation in international fairs)

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7.6 If relevant, please provide an example of a good practice from your region (i.e., specific tools, programmes, measures etc.).
[open question]

8 Support framework conditions

Please indicate to what extent the following support framework conditions are applicable to your region (1 = the condition is hardly applicable to the region; 5 = the condition is to some extent applicable to the region; and 10 = the condition is highly applicable to the region).

8.1 Presence of a platform to promote service innovation in the area (e.g., by means of conferences and seminars on service innovation)

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8.2 If relevant, please provide an example of a good practice from your region (i.e., specific tools, programmes, measures etc. that aim to support this framework condition).
[open question]
8.3 Strategy documents and roadmaps for the development of eco-industries in the region

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

8.4 If relevant, please provide an example of a good practice from your region (i.e., specific tools, programmes, measures etc. that aim to support this framework condition).

[open question]

8.5 Dedicated cluster organisation (cluster manager or similar) to coordinate the development of mobile services industries in the region

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

8.6 If relevant, please provide an example of a good practice from your region (i.e., specific tools, programmes, measures etc. that aim to support this framework condition).

[open question]

9 Additional framework conditions

9.1 Please indicate the framework conditions that were not mentioned in this survey but that you find vital for the development of the emerging industry in your region.

Whenever possible, please accompany your remarks with examples from your region of good practices supporting those framework conditions.

[open question]
**Annex B: Sample of analysed regions**

Based on the empirical analysis within WP3, the following three regions were selected for detailed case study descriptions for mobile industries:

1. Vienna (Austria);
2. South Finland;
3. Attiki (Greece).

Below we provide concise descriptions of each of the three regions.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Data</th>
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<tbody>
<tr>
<td>Region name</td>
<td>1 Vienna (Austria)</td>
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<tr>
<td><strong>Short description</strong></td>
<td>Vienna is the capital of Austria and one of its nine states. The city of Vienna has a population of about 1.7m at the end of 2010 and is the cultural, economic, and political centre of Austria. It has obtained the status of a federal state in 1921 and since then the mayor has also the role of the state governor. The city is administered by a multitude of departments under the supervision of the mayor and the state government. Geographically, Vienna is characterised by a strong economy that draws its strengths from high productivity and a highly qualified work force in combination with low wage costs per unit of output. The RTDI sector in Vienna is both business and public driven. In terms of policy areas, Vienna puts an emphasis on life sciences, information technologies and the automotive industry. Also, creative industries are a vibrant area of activity. Additionally, the environmental sector, in particular research, is claimed to be successful.</td>
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<tr>
<td>Relevant cluster(s)</td>
<td>IT-Cluster Wien</td>
</tr>
</tbody>
</table>
| Picture | Source: http://www.wibag.at/index.php?id=274  
| Website | http://www.clusterwien.at |
| Establishment year of the cluster | IT-Cluster Wien, the network for IT-companies; research-, development- and education institutions, was founded 2004 by the Vienna Business Agency. IT-Cluster Wien’s goal is to support especially enterprises in those fields with specific activities in relevant areas. Serving as a platform to realise ideas, initiatives and projects, IT-Cluster Wien wants to support networking between companies and colleagues as well as to establish contact with research-, development- and educational institutions. |
| Size of the cluster | One third of the IT and telecommunication companies are located in Vienna, Austria. |

Mobile services industries

Framework conditions for world-class clusters in emerging industries

More than 8000 national and international firms generate approximately 75% of the total revenue in the IT industry\(^\text{121}\).

<table>
<thead>
<tr>
<th>Main areas of activity</th>
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<td>The cluster aims to:</td>
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<tr>
<td>- Strengthen national and international competitiveness of the Vienna-based IT companies;</td>
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<td>- Develop innovative power of the collaborating partners;</td>
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<tr>
<td>- Promote collaboration in an active network of stakeholders.</td>
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</table>

Furthermore, the cluster has identified three main tasks. These are as following:

- Increase competitiveness of IT companies in the Vienna region by supporting SMEs in marketing and sales activities;
- Promote Vienna as a key location for IT companies;
- Support the internationalisation of specific projects from member organisations.

Noteworthy\(^\text{122}\):
- More than 8000 national and international firms generate approximately 75% of the total revenue in the IT industry.
- 8% of all enterprises in Vienna are ICT companies. The sector accounts for approximately 10% of Vienna’s gross regional income; employs around 10% of Vienna’s workforce; and produces 15% of regional added value, or 6.5 times more than Vienna’s traditional mainstay, the tourism industry.
- 99% of all the ICT companies in Vienna are SMEs.
- Around 50% of all ICT enterprises in Vienna are considered developing companies. Approximately 70 are active in high-tech R&D, employing 35,000, or 50% of the total ICT workforce in Vienna.
- Several universities and universities of applied sciences (“Fachhochschulen”) as well as a range of non-academic research organizations specialise in ICT-related basic and applied research. The leading research areas in the region are:
  - Quantum Computing;
  - Digital Image Processing and Computer Vision;
  - Embedded Systems;
  - Mobile Technologies;
  - Traffic Telematics;
  - Artificial Intelligence;
  - Voice Processing.

Region name | 2 South Finland
---|---
Short description | The southern part of Finland and is home to around 2.67m people. The South Finland region includes the only metropolitan area in Finland, though there are also sparsely settled rural areas. The region ranks among the highest in Europe in terms of education, creativity, knowledge economy, sectoral productivity performance and economic performance\(^\text{123}\).
Relevant cluster(s) | (1) Forum Virium Helsinki  
(2) Culminatum Innovation Oy Ltd


\(^{121}\) http://www.clusterwien.at/it/de/about-us/daten-und-fakten/


| **Website** | (1) http://www.fvh.fi/  
| **Establishment year of the cluster** | **Forum Virium**: 2005  
| **Size of the cluster** | **Culminatum Innovation**: 1995  
| **Main areas of activity** | **Forum Virium**:  
| | Forum Virium Helsinki develops new digital services together with businesses, the City of Helsinki and other public operators. They aim to do so by facilitating:  
| | - *Development projects*; brainstorming, training, preparing and implementation.  
| | - *Community management*; creation and management of networks, communication and events.  
| | - *Services for the partner network*; customised services according to the partner company’s specific business needs.  
| | **Culminatum Innovation**:  
| | Culminatum Innovation Oy Ltd seeks to improve the international competitiveness of the Helsinki region and to encourage the business utilisation of the region’s educational, scientific and research resources.  
| | The main function of Culminatum Innovation Oy Ltd is to implement and develop the Centre of Expertise Programme in the Helsinki region. Over the years 2007-2013 the Centre of Expertise programme covers nine cluster fields in the Helsinki region:  
| | - DIGIBUSINESS Cluster Programme;  
| | - Environmental Technology Cluster;  
| | - Food Processing Development Cluster;  
| | - HealthBio - Health Cluster;  
| | - Living Cluster;  
| | - Nanotechnology Competence Cluster;  
| | - Tourism and Experience Management Cluster;  
| | - Ubiquitous Computing;  
| | - Well-being Cluster.  
| | **Noteworthy**  
| | **Forum Virium**:  
| | Forum Virium Helsinki Ltd is owned by the City of Helsinki. Alongside of the Forum Virium Helsinki Ltd Board of Directors, Forum Virium Helsinki is led by its own Steering Group and Working Committee.  
| | Forum Virium Helsinki’s anchor companies are Elisa, Nokia, TeliaSonera, Tieto and YLE Finnish Broadcasting Company.  
| | Partner companies are IBM, Digita, Logica, Siemens, Sponda and SOK. Public sector partners are the City of Helsinki, Finnvera, Sitra, Tekes, Tieke and VTT.  
| | Furthermore, a large number of other cooperation partners from the metropolitan area take part in development projects.  
| | The cluster has a strong vision on what it aims to have achieved in 2015, which includes that by 2015, Forum Virium Helsinki has made Finland and the Helsinki Metropolitan Area an internationally recognised showcase for digital services.  
| | **Culminatum Innovation**:  
| | Culminatum Innovation combines the resources of its shareholders to promote...  
| 124 | http://www.cluster.org/students/participating-universities/aalto-university-school-science-and-technology  
| 125 | http://www.fvh.fi/  
| 126 | http://www.culminatum.fi/  
| 127 | http://www.culminatum.fi/
the growth of attractive competence environments in the region. This increases the region’s international competitiveness.

- Culminatum Innovation seeks business renewal, by joining the forces of researchers, companies and the public sector. User needs too are recognised, as a basis for providing firms with additional growth opportunities.
- Stakeholders of the organisation comprise a mix of regional council and municipalities, universities, research centres, companies and foundations, and financiers.
- These organisations include, and are not limited to, the Uusimaa Regional Council, Aalto University, VTT Technical Research Centre of Finland, and TeliaSonera Corporation.
- In 2012, Culminatum Innovation had a turnover of 7.0M EUR.

### Region name
3. Attiki (Greece)

### Short description
The region of Attiki, with its capital Athens, is the largest region of Greece. Over one in three people living in the country are concentrated in the region and account for over 40% of the country’s GDP. Attiki is also the major RTDI hub of Greece, accounting for over 60% of GERD. It is a metropolitan area with a dynamic services sector and one of the major exporting gates of Greece[^128].

### Relevant cluster(s)
Corallia (Hellenic Technology Clusters Initiative)

### Website
http://www.corallia.org/
Source: http://maps.pickatrail.com/europe/greece/attiki.html

### Establishment year of the cluster
2006

### Size of the cluster
There are more than 60 companies and 30 universities in this cluster[^129].

### Main areas of activity
Corallia is the first organisation established in Greece for the structured and systematic management and development of innovation clusters, with the strategic aim to develop cohesive and productive innovative ecosystems within which actors operate in a coordinated manner, in specific sectors and regions of the country, and where a competitive advantage and export orientation exists.

Corallia focuses on three knowledge-intensive thematic sectors:

- **Nano/microelectronics-based systems and applications** (named the mi-Cluster);
- **Space technologies and applications** (named the si-Cluster);
- **Innovative gaming technologies and creative content** (named the gi-Cluster).

[^129]: http://www.pappaspost.com/view-news/-/acontent/35844
Noteworthy

- Corallia acts as a one-stop-shop, through which the entire innovation network gains access to unique business opportunities and added-value services.
- They support new venture creation, where students and entrepreneurs "to-be" can apply innovative ideas and set-up start-ups.
- They expands the innovation-knowledge horizon with a thorough training program, through which members of the clusters gain best-in-class on topics ranging from technical skills on project management, to negotiation tactics and business plan development.
- Corallia leverages the top-tier Hellenic human capital (in Greece and abroad), which possesses a solid base in sciences and engineering and promotes the "Innovation Made in Greece" branding.
- The cluster has been referred to as having best-practices in a number of fields. For example, HTCI's cluster development model was recognised as a European best practice by DG Regio in June 2007.