EVALUATION OF
CLUSTER INITIATIVES

VÄRMLANDSMODELLEN
2.0

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This report summarizes a series of evaluation studies of organized clusters in Värmland, referred to as Värmlandsmodellen 2.0.

The evaluation work has been coordinated by Anders Olsson and Melinda From, both at Region Värmland.

Evaluation work based on publicly available company data (analyzed through the SIMPLER method) has been carried out by Anna Löfmarck and Håkan Wolgast at Bisnode AB. Mats Williams has coordinated the evaluation work with the cluster organizations, and Sergey Morgulis-Yakushev at Ivory Tower AB, has analyzed survey data in chapters 2-4 and produced all survey charts.

We would also like to extend our gratitude to the three cluster managers, Maria Hollander, JanErik Odhe and Göran Österman for their active support during the evaluation process.

Hopefully the results presented here can help in the process of improving cluster support programs, and developing the Värmland 2.0 model further in support of innovation and economic growth in the region.

Stockholm in October, 2014

Professor Örjan Sölvell
Research has shown that clusters play a critical role in innovation processes within regions. To understand why, we must see the cluster as a collection of different types of complementary actors – firms, large and small, domestic and multinational, suppliers and buyers, and many other related organizations that interact in both formal and informal ways. The most important type of actor is the firm. It is firms, and individual entrepreneurs that both plant innovation seeds, and take innovations to markets and subject them to the test of competition and demand. Another type of actor includes research organizations, which produce all sorts of innovation seeds. A third type is education organizations, such as schools and polytechnics. Universities are a special case, because they play the double role of being both research and education institutions. A fourth type is the capital providers, such as angel networks, public and private seed funding and commercial banking institutions, who provide the capital (equity/loan) needed for the exploitation of inventions and new business models. And, fifth, government and other public bodies are actors that make and implement policy decisions about public infrastructure investment, regulations, cluster programs and so on, critical for the innovation climate. The public side includes many levels of government and a wide range of public agencies.
A sixth very important type of actor includes different kinds of networking organizations, or what we refer to as “bridge builders”. Such organizations include, among others, science parks, incubators, innovation offices, research and technology organizations and cluster organizations.

When there is a critical mass of firms and other actors in a location tied to a particular sector or area of technology, the different actors can support each other, and new ideas are formed in both planned and unplanned meetings and interactions. Through interplay within the cluster, conditions are more likely to emerge that are adapted to the needs of the firms, and that are conducive to innovation. However, network and collaboration failures are typically abound in most clusters of the world, and this is precisely where cluster organizations and other bridge builders fit in.

By building a commons where firms, research and education institutions, and the other cluster actors can meet, exchange ideas and collaborate in projects, the innovation climate can be radically improved. In our earlier work we have identified the seven major cluster gaps in the commons. There are five internal gaps:

- The firm-to-firm gap barring interaction among firms in the cluster
- The firm-to-research gap barring interaction between firms and research organizations
- The firm-to-education gap barring interaction between firms and education organizations
- The firm-to-capital gap barring interaction between firms and capital providers
- The firm-to-public gap barring interaction between firms and public bodies
In addition there are two more gaps, external to the cluster, which are critical to innovation dynamics:

- The cross-cluster (firm-to-cluster) gap barring interaction with firms in other clusters/technologies
- The firm-to-global market gap barring interaction with global markets and value chains

Cluster organizations can help bring the different types of actors together, and overcome the seven cluster gaps. They can help connect business with academia, education institutions with industry, and large firms with small firms. They do this by providing activities and meeting places where common issues can be discussed and acted on jointly. They help the different actors overcome the obstacles and start talking to each other. And in doing so, they get the traffic moving along the paths and across the bridges.
Cluster organizations can facilitate many important functions based on three pillars. The first pillar is about overall cluster identity and attractiveness. Here the cluster organization is deeply involved in building a sense of belonging and identity, general trust and networking; in short, building the cluster commons. This pillar has a strong public component. The second pillar relates more directly to R&D and concrete innovation projects, where the cluster organization helps build bridges and stimulate traffic across the innovation gaps. Bridging to public organizations can lead to improved regulation and redirection of public investments. Bridging to research can involve incubator services and commercialization of research results, and bridging to education can improve HR supply and upgrading inside the cluster. The third pillar involves
business development across actors. Typical objectives and activities include export promotion/internationalization, joint trade fairs, joint purchasing and other commercial cooperation, often between SMEs not large enough to carry out these activities on their own. Pillar two and three are more private in nature and typically involves projects involving different sets of actors.

Figure 1-3 Three Pillars of Cluster Organizations

Evaluation or cluster organizations

As the political interest in cluster organizations has grown, so has the interest in evaluating the impact from their activities. Cluster evaluation is both about building robust evaluation models, but also about learning and action. As cluster policies and programs have become important parts of the political toolbox, one would expect that carefully planned evaluations should be mandatory, but our global studies show that only some 60% of cluster organizations are subject to formal evaluation programs.¹

Sound evaluation is important both to legitimize a policy or program, and to facilitate learning from the process in order to improve it.

In our evaluation work we use a mix of accounting data (the SIMPLER method) and views of managers as captured through surveys. Accounting data has the advantage of being objective and one can build control groups (firms not under the “cluster treatment”), to control for drivers of change outside the scope of the cluster initiative. Surveys on the other hand are of course subjective and full of biased responses. However, we expect such bias to be similar across clusters and constant over time, and thus the data can be used for comparisons across the three cluster organizations and for time series analyses. Also, by asking questions where the respondent makes direct references to the cluster initiative, one can partly control for outside explanatory factors.

This remainder of this report is divided into two strands of evaluation:

- What is the impact on cluster dynamics, i.e. closing cluster gaps through bridge building (survey results), following from the engagement in the cluster initiatives?

- What is the direct economic and social impact on member firms (SIMPLER and survey results) following from the engagement in the cluster initiatives?

Now, let us turn to our analysis on the success of the three cluster organizations in bridging the seven cluster gaps.
Using a set of earlier evaluation studies we can trace how the work of the three cluster organizations has impacted the cluster gaps through the creation of “bridges”. We measure impact related to six bridges (research and education being collapsed into one):

- The degree to which cluster activities improve inter-firm collaboration (Firm-to-Firm)
- The degree to which cluster activities improve collaboration between firms and universities (Firm-to-Research/Education)
- The degree to which cluster activities improve collaboration between firms and capital providers (Firm-to-Capital)
- The degree to which cluster activities improve collaboration between firms and public actors (Firm-to-Public)
- The degree to which cluster activities improve collaboration between firms and actors in related clusters (Firm-to-Cluster)
- The degree to which cluster activities improve collaboration in international markets (Firm-to-Global)

As we showed in an earlier report, referred to as the “Orangebook”\(^2\), cluster gaps were generally decreasing in the region, i.e. bridges were being built, throughout the period 2005-2009. But following the crisis one could discern that firms experienced weakened bridges. Some curves are now pointing upwards again, indicating stronger bridges, but there is no clear pattern concerning particular types of bridges across the three evaluated clusters. The data presented below shows to what extent the respondents judge that membership in the cluster organization has led to improved bridges to other actors in the cluster (firm-to-firm, etc.).

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Judging from the survey results (Figure 2-1) the two “traditional” bridges Firm-to-Firm and Firm-to-Research/Education have now stabilized (Firm-to-Firm pointing slightly upwards), and are still the two most important bridges. The negative development in Firm-to-Global markets has rebounded and has now improved quite significantly during the last two years. This might be the effect of a changed focus in the strategy of the cluster organization. Firm-to-Capital is the least attended gap and Firm-to-Firm the most attended gap.

Figure 2-1  ALPHA – Bridging Cluster Gaps
GOLF

For GOLF (Figure 2-2) we can see that most curves point upwards, i.e. member firms judge that the cluster organization is doing an even better job in bridging the various cluster gaps. Firm-to-Global and Firm-to-Public have lost since 2012. Firm-to-Capital is still the least attended gap, and Firm-to-Firm the most attended gap.

Figure 2-2  GOLF – Bridging Cluster Gaps
ECHO

ECHO shows a stable to slightly negative development for all bridges, except Firm-to-Research/Education, where developments have been radically improved, see Figure 2-3. Firm-to-Research/Education is the most attended gap and Firm-to-Capital the least attended gap.

Figure 2-3  ECHO – Bridging Cluster Gaps

Comparing the three charts one can clearly see differences across the clusters. In Figure 2-4 we show values for all three clusters for 2014, and here we make use of the full data (using a five-point Likert scale from 0-4). We do not have international benchmark data, but we judge the numbers (15% - 30%) to be relatively high, i.e. that the bridge-building activities of the cluster organizations does lead to increased levels of collaboration and interaction across the cluster gaps. The most impressive bridges within the three clusters are the Firm-to-Research/Education and Firm-to-Firm bridges.

ECHO sticks out as an over-performer on the Firm-to-Research/Education bridge, but an under-performer on the Firm-to-Firm and Firm-to-Cluster bridges. ALPHA is an over-performer on the Firm-to-Public and Firm-to-Capital bridges, and GOLF is an over-performer when it comes to Firm-to-Cluster (across to other clusters) bridge.
Figure 2-4  Bridge Building – Comparison of Three Clusters (2014)

Note: The vertical axis shows average reported effects (0-100%)
3 Impact on Member Firms

In this chapter we will turn to evaluation data measuring whether cluster initiatives have had a direct impact on member firms. First we report on the results from our work with public accounting data, measuring how well cluster member firms perform compared to control groups. Through the SIMPLER method, the data allows us to compare results of member firms of organized clusters, with 1) a control group of all firms in Värmland, and 2) firms with a similar industry composition not being part of the cluster activities. Second we will report on our survey results.

SIMPLER Results

The main performance measure used here is what we label “firm competitiveness”, i.e. the ability of a firm to create a value added larger than (personnel and capital) costs. Each firm is represented by its added value, and when aggregated, we get the total value added produced by the companies in the cluster, year by year. We then divide total personnel costs with value added and capital cost with value added, and depict this on a chart (see Appendix on Method). A cluster built on the sum of its firms that are using fewer resources (cost of mix of labor and capital) than its added value is considered competitive. Competitive clusters are depicted inside the triangle towards the lower left corner, and clusters that uses more resources than its added value, i.e. outside the 1-1 diagonal, is uncompetitive and at some point destroys value. Thus, the position in the diagram is an assessment of how competitive firms in the cluster are as a whole.

ALPHA

The first step was to define the member companies within ALPHA and collect data on their financials. The data used for comparison was a) all companies in the Värmland County and b) all companies within aggregated industry groups in another County with a large forest and paper sector (control group shown in figure below).

The cluster had a negative trend in competitive strength from 2007 and was hit hard by the financial crisis in 2009. In 2010-2011 the position was back on track, but declined again in 2012. The County was more affected by the financial crisis than the cluster. The cluster also recovered more quickly after the crisis. The industry control group had a
similar development over the period, but the competitive strength of the cluster was always on the stronger side (i.e. further down to the left in the Figure below).

**Figure 3-1**  ALPHA - Cluster Competitiveness Compared to the Industry Control Group (2007 – 2012)

The cluster was also compared in terms of value added growth. The County has lost 3% of its total value added during the period, whereas ALPHA increased its total value added by +4%. The industry control group grew by +8%. In terms of job creation, the County has lost 7% of jobs between 2007 and 2012. The industry control group has kept its number of jobs and ALPHA decreased the number of jobs by -2%.

The ALPHA cluster has achieved more than average performance in Sweden in most of the years (excluding 2009). In total, this accumulated over-performance (above the 1-1 line) amounts to a value of 3 018 MSEK. The industry control group has an underperformance most years, in total amounting to -875 M SEK.
In total, ALPHA is a more competitive group of companies than the total County. However, the control group exhibited even stronger growth. ALPHA loses less jobs than the County but more than the industry control group. The profitability of the companies in the ALPHA cluster leads to a surplus return when we compare to the industry control group.
GOLF

Again, the time series covers the period 2007 to 2012, and the data used for comparison was a) all companies in the Värmland County and b) all companies in Värmland across the same industries as represented within the cluster (industry control group shown in the Figure below).

The cluster exhibits better positions over the years than the Värmland County in terms of competitiveness. The cluster was less affected by the financial crisis in 2009, and compared with the regional industry control group, the cluster has been in a much better position during the last three years.

Figure 3-2  GOLF - Cluster Competitiveness Compared to the Industry Control Group (2007 – 2012)

The cluster has also been compared in terms of value added growth. The County lost 3% of its total value added during the period, while GOLF increased its total value added by
+38%. The local industry control group grew by +12%. This indicates that the cluster firms show a better growth performance.

In terms of job creation, the County has lost 7% of its jobs between 2007 and 2012. The local industry control group increased the number of jobs by +8% while GOLF has increased the number of jobs with +42%.

The GOLF cluster has achieved more than average performance in Sweden each year. In total, this accumulated over-performance (above the 1-1 line) amounts to a value of 1 246 MSEK. The local industry control group has also over-performed but only by 900 MSEK.

In total, GOLF is a much more competitive group of companies than the control groups. Value added is growing faster, and it grows more jobs. The profitability of the companies in the GOLF cluster leads to a surplus return when we compare them to the local industry control group.

**ECHO**

In the first step we defined the member companies within the cluster organization, and collected data regarding their financials. The data used for comparison was a) all companies in the Värmland County, and b) all companies in Värmland across the same industries as represented within the cluster (industry control group shown in the Figures below).

The cluster was economically competitive in 2007-2008, but the financial crisis affected the cluster very negatively. From 2010 onwards the cluster was moving towards average competitive strength. One firm dominates the development of the cluster, and by excluding this firm the development is similar but at a better level. The cluster was more affected by the financial crisis than the County overall. The cluster also recovered more slowly after the crisis, but if we exclude the dominant firm the recovery of the cluster is better than for the County.

The cluster is more competitive than the regional industry control group in 2007-2008 and was less affected by the financial crisis in 2009. The regional industry control group is also highly affected by a single dominant firm. From 2010 onwards, the local industry group is more competitive than the cluster.
Figure 3-3  ECHO - Cluster Competitiveness Compared to the Industry Control Group (2007 – 2012)
The cluster is also compared in terms of value added growth. The County has lost -3% of its total value added in the period, while ECHO has lost total value added by -18%. The industry control group has kept its value added.

In terms of job creation, the County has lost -7% of jobs between 2007 and 2012. The cluster decreased by -1% (excluding dominant firm +2%). The local industry control group decreased by -3%. The ECHO cluster has achieved less than average performance in Sweden. In total, this accumulated under-performance (below the 1-1 line) amounts to a value of -97 MSEK in total (excluding the dominant firm the cluster over-performs by +2 018 MSEK). The regional industry control group underperformed by -1 189 MSEK.

In total, ECHO is a more economically competitive group of companies than the total County and the industry control group – but only if the dominant firm is excluded. It loses more value added than the County and the regional industry control group.
However, it loses fewer jobs than the County and the local industry control group. The profitability of the companies in the ECHO cluster leads to a surplus return when compared to the local industry control group.

**Survey Results**

As reported in earlier evaluations, cluster firms have experienced positive effects from cluster membership across a range of variables. Here we use six performance variables, three economic and three social indicators inside the firm:

**Economic indicators**
- Sales increase
- New or better products and services (innovation)
- Employment increase

**Social indicators**
- Equality
- Integration
- Sustainability

Interesting to note is that in recent years the social indicators have increased rapidly.
As can be seen from Figure 3-4 curves still point upwards for pretty much all performance indicators. This is a very good result. However, the traditional leading indicators "sales increase" and “innovation” have dropped. All social indicators are on the rise.

**Figure 3-5  ALPHA – Impact on Member Firms**
GOLF

For GOLF curves still point upwards for almost all performance indicators (Figure 3.5). This is a very good result. Particularly, the cluster initiative has had a strong impact on employment growth (green line in Figure). Economic indicators are stronger than social indicators overall.

Figure 3-6  GOLF – Impact on Member Firms
ECHO

Overall the impact on member firms has dropped since 2012. However, two social indicators (integration and equality) is on the rise, see Figure 3-6.

Figure 3-7  ECHO – Impact on Member Firms

So let us compare the three clusters. As is shown in Figure 3-7, effects on innovation is still the leading performance variable (largest impact across the three clusters shown towards the left hand side). ALPHA takes the lead on social indicators (sustainability, diversity and equality), whereas GOLF sticks out regarding employment effects. ECHO generally has lower results than its two peers.
Figure 3-8  Comparison of Economic and Social Impact on Firms in Three Clusters (2014)

Note: The vertical axis shows average reported effects (0-100%)
After several years of meticulous evaluation work we can conclude that the cluster initiatives have had positive effects across a range of performance variables in both building cluster bridges and enhancing firms’ economic and social performance. This is confirmed both by survey results and the SIMPLER analysis. Clearly, the three different cluster organizations are successful in different dimensions, but also to the degree to which they are successful.

In general, results tell us that the cluster organizations have a stronger impact on building bridges than directly on member firms, which is also the main task of the organization. So let us take a closer look at the bridge building results in the three studied clusters.

In Figure 4-1 the three clusters are compared (2014 values), where strength of bridge building success now is measured as relative to the two peers, again using the 4-point Likert scale (no effect to very large effect).

ALPHA is best at bridging Firm-to-Firm and Firm-to-Capital, GOLF in the areas of Firm-to-Firm, Firm-to-Cluster (i.e. cross-cutting clusters) and Firm-to-Global, and finally ECHO is successful in bridging Firm-to-Research/Education and Firm-to-Public. Overall, one could argue that each cluster organization adds to bridge building inside their clusters in only 2-3 of the six areas, where GOLF takes the lead with three bridges. If the aim is to help close all cluster gaps there is much room for improvement.
Figure 4-1  Bridge Building Success in the Three Clusters (2014)

Note: each slice shows 4 segments ranging from one segment filled = small effect, to four segments filled = very large effect, as measured as a comparison within the group of three cluster organizations

As a learning exercise, each cluster organization can compare their bridge building success with their plans, i.e. do bridge building success match with strategies and activity plans?

**Bridge Building and Impact on Performance**

In a second round of our comparative analysis we link each bridge to its impact on member firms’ economic and social performance. The argument here is that in the end better functioning bridges in clusters should lead to enhanced traffic and firm performance. One can imagine that thin bridges can support intense traffic and impressive results on firm performance, while in other cases robust and well-built bridges are idle, supporting little traffic in terms of real collaborative projects, and thus creating limited effects on cluster firms.

In the case of ALPHA we can see that in terms of economic performance (combination of enhanced sales, innovation and employment growth) three bridges are crucial (impact is marked green in the outer circle in Figure 4-2 below):

- Firm-to-Research/Education
- Firm-to-Global
- Firm-to-Public

Cross-cutting bridges to other clusters (Firm-to-Cluster) do not seem to lead to improved economic performance among the member firms (marked red as weak impact).

In terms of social performance (combination of impact on sustainability, equality and integration) the most important bridges are:
• Firm-to-Research/Education
• Firm-to-Public

Figure 4-2  Bridge Building and Firm Performance – ALPHA (2014)
If we turn next to GOLF we have a somewhat different picture. For the economic indicators we can see that three bridges are important:

- Firm-to-Firm
- Firm-to-Global
- Firm-to-Public

Firm-to-Research/Education bridge building has neither led to enhanced economic nor social performance. Firm-to-Firm and Firm-to-Cluster bridges add to social performance.

**Figure 4-3  Bridge Building and Firm Performance – GOLF (2014)**

Finally, a closer look at ECHO shows that improved economic performance among member firms is mostly connected to bridge building in the areas of:

- Firm-to-Firm
- Firm-to-Cluster

On the other hand Firm-to-Research/Education has not led to improved economic or social performance.
All in all this analysis tells us that the three clusters create very different results in terms of bridge building, and that impact on member firms’ performance relates to different bridges in the different clusters. Sometimes thin or more narrow bridges lead to more impressive results (one-two segments filled in the pie chart) than wide bridges (three to four segments filled).

The common thread is that Firm-to-Firm networking seems to be the dominant theme leading to positive economic and social outcomes (moderate to strong impact) across all the three clusters. This also holds true for the Firm-to-Public bridge.

For two of the clusters (GOLF and ECHO) the work on the Firm-to-Research/Education bridge has not had any real impact on the firms’ performance. One might speculate that this type of bridge is better built by other forms of organization.
The evaluation work on clusters in Region Värmland has followed two methodological streams: one based on public corporate data (SIMPLER), measuring effects on firms following from cluster membership, and one based on subjective data collected through the means of a web survey to all cluster member firms.

Survey

The web survey was distributed via Email (pointing to a unique link for each cluster to the web based survey instrument) during the period May - September 2014. Emails from cluster managers, with the invitation to the survey, were sent to all member firms.

The response rate from respective clusters was as follows:

- ALPHA (53%)
- GOLF (32%)
- ECHO (46%)

The total number of complete surveys includes 120 observations, or a 44% response rate. There were no significant differences between responses collected in the first wave (May-June) and the second wave (August-September) of data collection among all variables. Thus, we did not expect to get significantly different results by extending the survey period in order to reach higher response rates.

The survey including just over 20 questions was divided into five sections:
- Information about respondent and company
- Questions referring to cluster dynamics (“bridges”)
- Questions referring to direct impact on the member firm
- Extra questions added by the cluster organization
- Open question where proposals for improvements could be added

The survey results are presented in graphs in chapters 2-4. Figures 2-1 to 2-3 were constructed based on the variable Bridge. The variable Bridge is assigned a value of 0 if
the respondent said “Nej inte alls”, and is assigned a value of 1 if the respondent said “I liten omfattning”, “Varken i liten eller stor omfattning”, ”Ja i hög grad”, or ”Ja i mycket hög grad”. Then the variable Bridge was averaged for different types of the Cluster Bridges.

Figure 2-4 was constructed based on the variable BridgeNew (Likert scale from 0-4). The variable BridgeNew is assigned a value of 0 if the respondent said “Nej inte alls”, 1 if the respondent said ”I liten omfattning”, 2 if the respondent said ”Varken i liten eller stor omfattning”, 3 if the respondent said ”Ja i hög grad”, and 4 if the respondent said ”Ja i mycket hög grad”. Then the variable BridgeNew was averaged for different types of the Cluster Bridges and normalized by dividing by the maximum value (4), creating a scale 0 – 100%. This scale is more detailed than the one above (0/1), and thus we expect values to be lower overall, and results of 15% - 30% indicating real effects.

Figures 3-1 to 3-3 were constructed based on the variable PerfIndicators. The variable PerfIndicators is assigned a value of 0 if the respondent said “Nej inte alls”, and is assigned a value of 1 if the respondent said ”I liten omfattning”, ”Varken i liten eller stor omfattning”, ”Ja i hög grad”, or ”Ja i mycket hög grad”. Then the variable PerfIndicators was averaged for different types of the Performance Indicators.

Figure 3-4 was constructed based on the variable PerfIndex. The variable PerfIndex is assigned a value of 0 if the respondent said “Nej inte alls”, 1 if the respondent said ”I liten omfattning”, 2 if the respondent said ”Varken i liten eller stor omfattning”, 3 if the respondent said ”Ja i hög grad”, and 4 if the respondent said ”Ja i mycket hög grad”. Then the variable PerfIndex was averaged for different types of the Performance Indicators and normalized by dividing by the maximum value (4).

**SIMPLER**

The SIMPLER method compares the efficiency (competitiveness) of all firms of a cluster compared to control groups. Also, values for value added growth and job growth are presented in Chapter 3.

Efficiency for a firm is measured as creating a value added larger than the sum of personnel cost and cost of capital (where the 1-1 diagonal in the Figure below represents the border between competitive and uncompetitive firms). Data covers the period 2007 – 2012.
In the figure below all firms in Värmland is shown on the “competitiveness chart” (size of bubble corresponds to size of the firm). The dense area in the upper left-hand corner consists of labor intensive service companies (high degree of personnel costs as opposed to capital costs).

Figure   SIMPLER Chart for Värmland County (2012)