Capturing Competence in Imaginary Organisations[1]

Sofie Roy
PhD Student
School of Business, Stockholm University
S-106 91 Stockholm, Sweden
Phone no: +46 70 772 82 89
sr@fek.su.se

Abstract

Organisations cannot achieve its tasks without competence. It is considered as the base for all organisations' survival. Today an increasing number of organisations rely heavily on networking with other organisations to achieve tasks. What impact does this strategy have on the build up of competence in the own organisation? Does networking imply that the organisation risks losing its competence in one area to another organisation? If that is the case, what can the organisation do to capture that competence?

In this paper, which is based on a course project that I conducted at the University of Bergen, I compare the build-up of competence in traditional organisations with competence in imaginary organisations. I have identified a few problems with relying on other organisations for task performance and two possible ways of avoiding those problems. System dynamics is used as a tool for analysing the behaviour in two types of organisations and for testing policies for capturing competence.

Introduction

Organisations cannot achieve its tasks without competence. The creation, use, and development of organisational competence is thus of critical importance for an organisation's survival. Nonaka (1984) defined competence as an organisation's creation of procedures, routines and norms to create and store knowledge.

Traditionally, organisations have mostly relied on their internal, and mainly physical, competence to achieve tasks. Organisations have acted more or less independently in relation to other organisations. Over the past decades, however, a shift of focus towards more intangible, knowledge based, competences has taken place in many organisations. According to a research group at School of Business in Stockholm (see e.g. http://www.fek.su.se/io/), an increasing number of the organisations today create networks consisting of many interdependent organisations that rely on each other's internal, and often intellectual, competencies to achieve tasks. The emergence of this type of organisations is said to be due to an increase in customer demands, a sharpened competition and increasing requirements on flexibility. To be able to cope with these demands, organisations need to co-operate and share competencies instead of having to develop all competencies internally.

One example of a group of organisations that function this way is imaginary organisations. Hedberg *et al* (1994) define imaginary organisations as: "*organizations where important processes, actors and resources appear both*

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inside and outside of the legal unit of enterprise, both outside and inside of the accounting system and of the organizational charts. Markets and hierarchies are interconnected through networks of cooperating people and coordinating information technology."

Imaginary organisations consist, according to Hedberg *et al* (1994), of four important systems; the customer base, the leader enterprise, the market communication tools (e.g. delivery and payment systems) and the partner networks, where the customer base is considered the most important system. The leader enterprise holds the system's core competencies and co-ordinates the interaction between the networking partners and the customers.
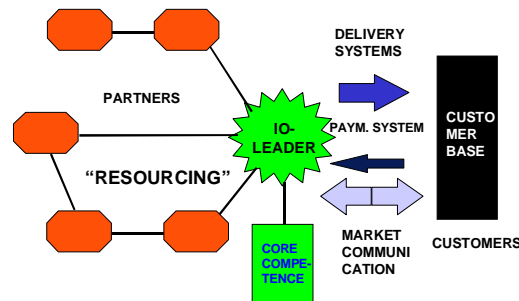

Figure 1:1; The Imaginary System (from http://www.fek.su.se/home/boh/ 1999-11-02)

Five main activities hold imaginary organisations together (Hedberg & Olve, 1997);

- "The *sharing of infrastructure* such as information technology, delivery systems, warehouses, procedures, processes, etc.
- The *pooling of financial resources* or resources that otherwise would require financial capital.
- The *pooling of competence* as expressed through human resources, expertise, access to networks, information, knowledge, capabilities, etc.
- The fragile and delicate *process of building and maintaining mutual trust* between partners and individual actors in the imaginary system.
- The *building of relationships, trust and identity*, either from the market and onwards into the organization, or through deliberate attempts to establish a shared image, a brand name etc."

The focus in this paper is on the pooling of competence in the organisation. Being a part of the research program on imaginary organisations, I have looked at how the development and use of organisational competence is treated in this type of organisations. There are a number of questions that triggered the study that lead to this paper: What happens to task performance (defined as the outcome of the organisational competences and is considered as a prerequisite for the creation of products and services and thereby also the organisation's income) when the leader enterprise relies heavily on experts from other organisations to achieve tasks, instead of on internal staff? Are there any problems or risks associated with using experts from other organisation to help the internal organisation achieve its tasks? If there are, what can the organisation do to avoid or deal with those risks? And, more importantly, what happens to the expert competence that is created during

the task performance and that most often leave the organisation when the task is completed? What can the organisation do to capture and develop that learning and competence? Is there a way of capturing and storing that competence and thereby make it available and useful to the internal staff?

There are hence many closely related questions that triggered the studies that lead to this paper. The main research question in the paper is however; *What happens to the organisational competence and task performance when an organisation relies increasingly on external experts to achieve tasks?*

With this research question in mind, the purpose of my study was to develop a model, where I compared traditional organisational theory to the theory of imaginary organisations. In this paper I will analyse the outcomes of the model and the result of how various policies can capture the competence that is built up when the experts in an external firm is working on a task.

Outsourcing

To put the research problem in context, I will point out a few advantages and disadvantages with imaginary organisations that are relying on external experts for task completion. My assumption in the project was that reliance on external experts has the same consequences for the internal organisation as strategic outsourcing. Outsourcing was thus seen as one of the activities that imaginary organisations take on when networking with other organisations. An important difference between outsourcing and imaginary organisations is that the imaginary organisation regards the outsourcing firm as part of the own, extended, organisation (outsourcing may thus not be a correct term – a more suitable word may be insourcing). However, difficulties with losing competence to the extended organisation is still a problem, as the couplings between the different organisations oftentimes are very lose and can thus easily be resolved. The competence built up in the outsourcing organisation will thereby leave the imaginary system with the experts.

The figure below illustrates a few key features in an imaginary organisation. Outsourcing is considered as one of them.
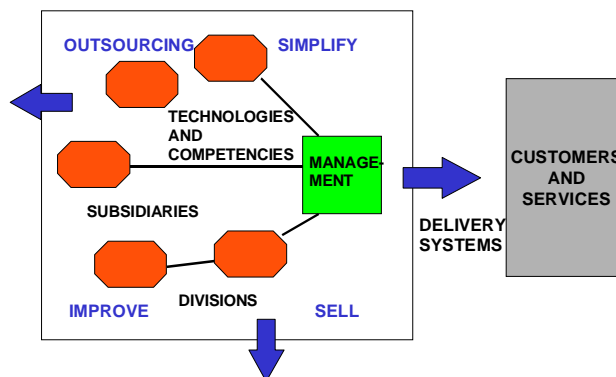

Figure 1:2; The Imaginary System, using external organisations to achieve tasks (from http://www.fek.su.se/home/boh/ 1999-11-02)

The concept of strategic outsourcing has emerged the last two decades (see Rumelt, 1974). It is closely related to an organisation's core competence (for a further discussion see e.g. Quinn, 1992, and Quinn & Hilmer, 1994), which can be defined as those activities that the organisation can do better than everyone else. Given this (somewhat naive definition of core competence) outsourcing can be seen as the activities that the organisation is not "the best at" and thus leaves to other organisations to take care of.

According to Quinn and Hilmer (1994), the combination of concentrating on the organisation's core competencies and outsourcing activities that are not critical to the organisation, allows managers to "leverage their company's skills and resources well beyond levels available with other strategies" (Quinn & Hilmer, 1994, p. 43). Organisations maximise the returns on their internal resources by concentrating their investments on what they do best themselves. Imaginary organisations have discovered and taken advantage of this when creating their networks of closely co-operating partners.

There are, however, a few problems or risks associated with outsourcing value creating activities. Quinn and Hilmer (1994) identified three; "*(1) loss of critical skills or developing the wrong skills, (2) loss of cross-functional skills, and (3) loss of control over a supplier*". In imaginary organisations similar risks face the leader enterprise. If organisational tasks are outsourced to an extension of the internal organisation, the experts will build up unique experience and knowledge that are inaccessible to the leader organisation when the experts leave the organisation. The internal organisational will therefore lose the skills associated with the task performance and become increasingly dependent on the extended organisation. Using experts to perform a task is often expensive, and by also losing the competencies, the concern becomes even larger.

There are a few alternative solutions to the problem of losing all the competence that the experts build up and thereby getting too dependent upon outside experts. I focused mainly on two in the project, interaction and knowledge documentation.

Interaction

Since interaction between skilled people in different functional activities often lead to unexpected new insights or solutions, many companies fear that outsourcing will make such cross-functional serendipity less likely. This is due to that outsourcing, as identified above, often leads to decreased interaction between experts and other staff decrease.

Another related problem was brought up by Grant (1997). He stated, "*the critical source of competitive advantage is knowledge integration rather than knowledge itself. Specialized knowledge cannot, on its own, provide a basis for sustainable advantage, first, because specialized knowledge resides in individuals, and individuals are transferable between firms; second, because the rents generated by specialized knowledge are more likely to be appropriated by individuals than by the firm.*" My interpretation of Grants statement is that the knowledge generated through working on a task somehow has to, in order to be useful to the internal organisation, be transferred from the individual, i.e. the expert, to other individuals and thus integrated in the internal organisational competence. The human capital thus has to be turned into structural capital. One possible way of doing this and thereby also avoid the first problem, is by increasing the interaction

or socialisation between the organisational staff and the experts. Interaction could involve common activities, primarily work-related but also purely social activities.

Interaction is, according to Nonaka and Takeuchi (1995) among others, one of the most efficient ways of integrating and transferring knowledge. Even tacit knowledge can be captured this way, which otherwise can be extremely difficult. Kogut & Zander (1992, in Grant, 1996) stated, "*Explicit knowledge is revealed by its communication. ... Tacit knowledge is revealed through its application. If tacit knowledge cannot be codified and can only be observed through its application and acquired through practice, its transfer between people is slow, costly, and uncertain.*" Interaction through working together on a task would thus help this knowledge integration process.

Quinn & Hilmer (1994) supported this and stated that it may even lead to further knowledge development because through interaction "*the 'employees' knowledge base can be much higher than if production were inhouse, and the creativity benefits can be even greater.*"

A situation where internal staff interacts with external staff will therefore be tested as one possible solution to the problem of losing competence due to outsourcing.

Knowledge documentation

Another possible way of capturing expert knowledge is through task documentation. By requiring constant documentation from the experts' experiences and learning while working on a task, the organisation will build up a knowledge base. This knowledge base can then be made available to the organisational staff who can then integrate the expert's competencies in their own competence. This knowledge base can be made available to the staff in the organisation through for example an Intranet, data warehouses etc.

A problem with this way of making expert experiences accessible to the organisation is that it is often not enough to store information to create value. The information in the database can be difficult to interpret and use and the experts' tacit knowledge is not captured this way. According to Sveiby (1997) enhancement of competence through information is not sufficient, "*one needs more osmotic methods that resemble the traditional passing down of knowledge from master to apprentice*". Thus, information-storing alone is will no fill the purpose – interaction is also required.

Grant (1996) took a step further when stating, "transferring *knowledge is not an efficient approach to* integrating *knowledge. If production requires the integration of many people's specialist knowledge, the key to efficiency is to achieve effective integration while minimizing knowledge transfer through cross-learning by organizational members*" (emphasis in original). This implies that working together on a task is more useful and efficient than pure information storage or even pure socialisation.

These two different strategies of overcoming the problem of lost competence due to experts leaving the organisation will be tested and analysed in a formal simulation model below. Before that however, I will discuss why my research problem can be applied in a system dynamics setting.

Model construction and description

My project consisted of four cases (detailed feedback loops for each case and the full simulation model are found in the appendix at the end of this paper). The first two cases focused on the difference between performing a task internally in the organisation versus letting a group of experts in an extension of the organisation perform the task. The first case was based on traditional organisational theory, where organisations perform all task activities themselves, i.e. they do not concentrate their task activities to their core competence. The organisation only uses their internal formal and organisational competence to achieve their tasks.

The focus in the first case was on how formal and organisational competence build up when working on a task, how that affects task performance and task profits and how that in turn affects the recruitment of new staff. Formal competence is defined as the sum of the staff's formal education and training plus a fraction of learning that takes place when staff is working on a task. Formal competence is primarily seen as the explicit competence in the organisation. Organisational competence, on the other hand, is both explicit and implicit, and can be seen as the effects of interaction between the staff in the organisation, routines, and common organisational property. It is built up over time through organisational learning.

In the second case I applied the theory of imaginary organisations and outsourcing, where activities that are not part of the leader enterprise's core competence are performed by experts in an extension of the organisation. This is done co-operation with the internal organisation but with limited interaction between the internal staff and the external experts. The project research problem can be identified in this case, looking at how the experts' competence build up when working on the task, whereas the internal organisation's competence does not reach the same level as when the organisation is working on the task alone. To incorporate one of the fundamental ideas with imaginary organisations the experts work on the task *in* the extended organisation, i.e. in close co-operation with the internal organisation.

Letting experts perform the task will most likely lead to a higher task performance, since experts are assumed to work more efficiently and not need training to become experienced. However, task costs will build up faster as the experts are assumed to be more expensive to hire than internal staff.

In the case #3 and #4, I looked at two ways of integrating the expert competence in the internal organisation's competence. This was done by increasing the interaction between staff members and experts and through documentation of experiences. These actions taken are supposed to decrease the risk of making the organisation too dependent upon one group of experts. This is especially important due to the fact that imaginary organisations sometimes lack legal contracts between organisations and thus a safety net if the relation between the organisations does not work out as expected.

Simulations and simulation analysis

After having gone through the model-structure in the four base cases, I analyse the behaviour of the model below. I have divided the simulation analysis into time periods with important changes or shifts. I analyse each case separately and then summarise the results at the end of this chapter.

Case #1 - internal organisational competence

In the first time period, time 0-20, the formal competence in the internal organisation (FC) decreases slightly from its initial value. The decrease is a consequence of new staff entering the organisation with a lower degree of individual FC than the experienced staff. This brings the total FC to a lower level than previously. Another cause of FC going down is that new staff entering the organisation requires training, which takes time from the experienced staff and thereby decreases the total FC.

As a result of the initial staff's formal competence, the internal task performance (ITP) starts to build up in the first time period. This build-up is caused by the reinforcing loop Formal Competence (see figure 1). The increase in ITP occurs with a certain delay, which is due to initial difficulties in communication, co-operation and co-ordination. The experienced staff in the organisation does not yet know one another, which causes certain communication difficulties and thus takes time from the ITP. ITP is also repressed by the slight decrease in FC.

When the experienced staff is working on a task they create organisational competence (OC). The OC is growing due to a reinforcing loop (see figure 1, Organisational Competence). At time 0 the OC has a value of 0, which is due to that the organisation is new and therefore has not yet been able to create any OC. As experienced staff work together on a task however, the OC begins to increase as a result of organisational learning. Organisational learning is created through the interaction between the experienced staff and thereby the creation of common routines, internal task documents and other organisational properties that create a basis for the organisation's competitiveness.

The reinforcing loop dominates the build up of OC in the time-period 0-10. At about time 10, the exponential growth in OC is limited by the organisational
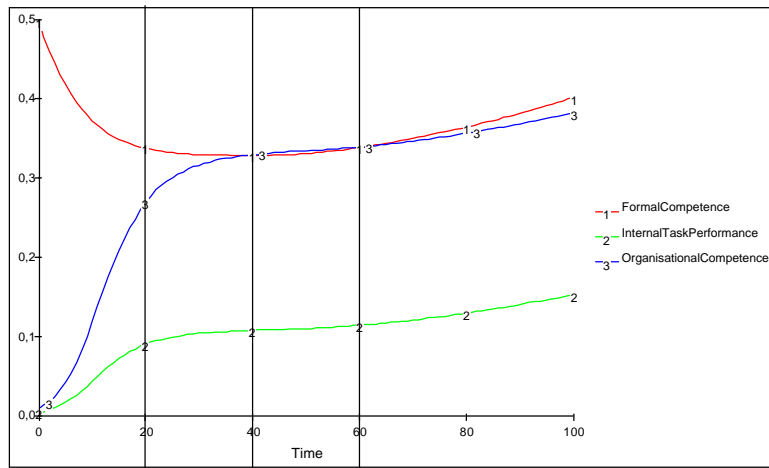
learning potential. The balancing loop Organisational Learning Potential now dominates the reinforcing loop. OC will continue to increase for a while, but the learning potential will slow the organisational learning down.

Simulation Case #1: Internal organisation's formal and organisational competence, and the resulting task performance. The graph shows the development of competence and task performance in the organisation.

As shown in the graph above, there is a slight delay in the build up of OC which is, as discussed in the case of ITP creation above, due to difficulties in

communication, co-ordination and co-operation. Interaction between the experienced staff takes time from task performance and will thereby cause a slight delay in the build up of OC.

In the time-period 0-38 the organisation will not make a profit. This is due to that ITP initially is very low, and that the organisation thereby only gets a very small income from ITP. Since ITP is assumed to be the only source of income in the organisation, there will hence be no profit. The costs will exceed the incomes due to that the organisation must pay their experienced staff salary and pay the cost of training new staff, even though they only bring in little income. As ITP increases however, task profits begin to build up.

Time 20-40

In the next time period, FC levels off and stays at an equilibrium level. This is a consequence of that the organisation is now "getting used to" the constant flow of new and experienced staff through the organisation. The individual's learning potential in the organisation is still high, which means that there are many opportunities to increase the level of FC by bringing in additional staff to the organisation.

As a consequence of FC's constant level, ITP now begins to settle as will. This in turn causes the increase in OC to slow down and level off at the end of the time period. The organisation's learning potential is now considerably lower than in the first time period. To add more OC thus requires more staff to come into the organisation, which yet again will cause communication, co-ordination and interaction problems between the internal staff. When these problems have been overcome however, the OC will be at a higher level than previously.

The FC and OC is at the end of the time period at the same level, which implies that the early co-ordination problems now have been overcome. However, there are still benefits to get from increased co-operation, especially in terms of synergy effects that often is present in well co-ordinated organisations. This is seen in the next time-period.

At about time 38, the task organisation is beginning to make a profit from task performance. Since the policy in the organisation is to reinvest all profits into recruitment, the number of new staff will now slowly start to increase. The results of this are seen in time 40-60.

Time 40-60

A few interesting things occur in this time-period. One is that OC now exceeds FC. This means that the effect of the staff's efforts to communicate and co-operate now pays off in terms of a synergy effect. The OC is thus worth more than the sum of the individual's competencies. This also has a positive effect on task performance, which continues to increases slightly. The organisation is now building a good basis for the development of new products and services, and thereby also a base for future profits and expansion possibilities. This becomes even clearer in the last time period.

The other interesting issue that I would like to point out is the slow increase that is now present in the number of experienced staff. This increase is a result of the investments in recruitment of new staff from the previous time-period. This new staff is now being trained and are slowly becoming experienced staff. This results

in an increase in FC, which can be seen at the end of the time-period. OC and FC are again at the same level and this also causes ITP to increase somewhat. The organisational expansion is now slowly starting to pay off.

Time 60-100

The build-up of OC and FC in the previous time-periods, are really paying off and giving results in this last time-period. The earlier reinvestments in the recruitment of new staff now prove to become more and more profitable. FC and ITP are increasing immensely and thereby also OC. OC once again falls below FC, as analysed in first time period, that new staff in the organisation come in with a lower level of individual competence and therefore require training in order to get up to the same competence level as experienced staff. This takes time and effort in terms of communication and co-ordination.

Case #2 - Extended Organisation

In this second case, the internal organisation's behaviour will be the same as in the previous case, but the values of the key variables (OC, FC and ITP) will end up at a higher level than previously. This is due to that reinvestments in new staff can be done at an earlier stage in case #2 than in case #1. The reason for this will be analysed below.

A major change that has been done is that the costs of internal staff does no longer have an impact on the task profit. This may seem strange, but it is done because the extended organisation is now thought to replace the internal organisation in the task performance. The internal costs are therefore no longer relevant to the task profits. ITP is therefore not relevant for the organisation's income either and is substituted by the extended organisation's task performance (ETP). The extended organisation's cost also substitute the internal costs. The assumption here, which has been pointed out previously, is that experts are more expensive than internal staff. The total costs will thus be higher in Case #2.

The changes that have been made make it somewhat difficult to compare the outcome in the internal organisation in case #1 and case #2. Since the extended organisation is now assumed to be the only source of income and the only cost, the effects on recruitment will be rather different than in the previous case. The recruitment of internal staff will increase as the profits go up, which also means that the OC FC and ITP will increase.
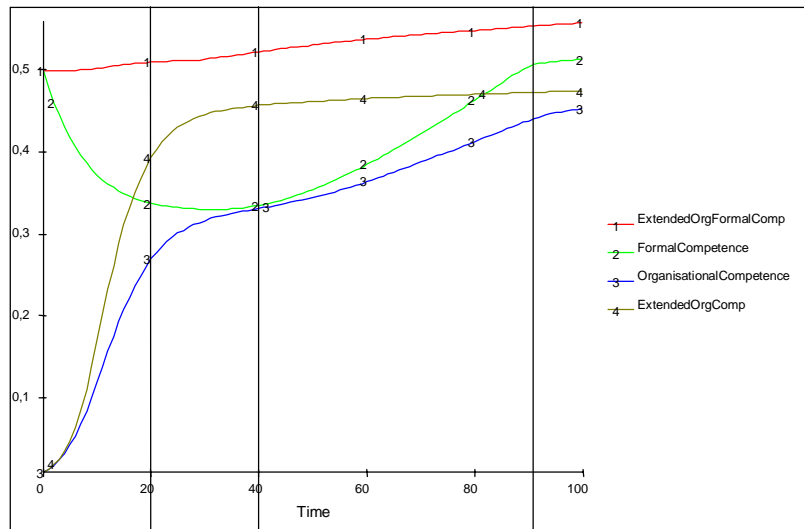
Simulation Case #2: The graph shows the behaviour of the internal and extended organisation's formal and organisational competence.

Time 0-20

In time period 0-20 the internal organisation shows the same behaviour as in Case #1, i.e. the FC falls slightly, whereas OC builds up and starts to level off when the learning potential starts to limit the organisational learning. In the external organisation, the formal competence, referred to as EFC, has the same initial value as FC, i.e. 0,5. EFC is initialised by the total number of experts (10) in the extended organisation and their base competence 0,05.

EFC starts to build up at about time 5. This is a result of the learning that experts get from working on a task. The reason for EFC not to decrease the same way as FC did is that the experts have a higher degree of competence when they are recruited into the extended organisation than the new staff, and they do therefore not have to go through training to become experts. This will also lead to improve the extended organisation's task performance (ETP), which in turn leads to a faster increase in its organisational competence (EOC). EOC is however also limited by the organisational learning potential and the balancing loop will thus start to dominate the reinforcing at about time 10. This will cause the OC growth to slow down.

The slow start in the creation of OTP and EOC is a result of the time that initially is needed for communication and co-ordination. As people get to know each other however, ETP improve rapidly.

In the first time period, the internal organisation does not gain any profit from ETP. Compared to case #1, the organisation now actually loses more money. This is a consequence of that experts cost more to hire than internal staff. However, ETP is considerably higher and the quality of the work is most probably higher as the experts are assumed to be specialised at the specific task. The high cost could thereby be seen as a long-term investment in high quality products or services.

Time 20-40

As the organisations become more and more established, EFC and EOC change less than previously. This is due to that both the internal and extended

organisation are at a level where the people in the organisations have got to know each other and find little problems in communication. In the internal organisation the new and experienced staff have found a balance between working on a task and training the new staff entering the organisation. At the end of the time-period OC consequently ends up at almost the same level as FC.

In the extended organisation, EFC is increasing slightly. At about time 28, the EFC goes into equilibrium, but soon starts to increase again. The equilibrium state is due to a constant individual learning and a constant flow of experts through the organisation. The increase at about time 30 is a result of that task profits are now starting to increase. The internal organisation will therefore reinvest the money in recruitment of additional experts. This increases EFC and thereby also ETP. The high initial investments in the extended organisation and the initial loss of money are now repaid through a higher level of task performance and thereby a higher and still increasing EOC, which creates an even better basis for the creation of new products and service.

Time 40-90

The extended organisation continues, as a result of new experts being recruited, to improve its ETP. The internal organisation thereby makes an increasing profit from the extended organisation and is able to sell high quality products and serviced to its customers. The problem now is however that the internal organisation has no competence in the task area and is therefore also increasingly dependent on the EFC and EOC. The extended organisation has built up a competence base that is crucial to the internal organisation, but is not owned by the organisation. This means that if the extended organisation decides to start working for another organisation, the internal organisation will have to invest a lot of money to build up new competence in order to get the same quality in task performance as the extended organisation has provided them with.

The result of the simulation hence confirms the theory of outsourcing - the quality of the internal organisation's products and services increase, thereby also the profits, but at the cost of an increasing dependence upon the extended organisation. The issue is now to test different ways of capturing the competence that is built up in the extended organisation and thus decrease the dependence slightly. This is done in the last two simulations.

Important to point out is however, that the internal organisation's possibility to sell higher quality products and services to its customers, also leads to a higher degree of customer satisfaction and loyalty etc. The use of external experts can thus create a reinforcing loop where increased customer satisfaction and loyalty lead to more profit, even higher task performance and so on. The trade-off between the internal and external organisation can therefore be improved, especially if they can find a way of sharing knowledge and competence.

Another interesting point to make in this simulation is that EOC never reaches the same level as EFC. This actually implies that the experts are less efficient when they are working together than they are when working one by one. This may be a result of that their individual competence is so high that it makes it difficult to communication, co-ordinate and share the competence with the rest of the experts and thereby create a synergy effect. However, the lower level is also a result of a high turnover in the extended organisation. If that level could be decreased, the EOC would end up at a higher level than EFC, as the experts then have more time

to communication and co-ordinate their actions and thereby create a synergy effect. This therefore implies that the organisation should put effort into creating incentives to make the experts stay with the organisation longer.

In the internal organisation, the high profits from ETP has now lead to a lift in FC, ITP and OC. FC increases relatively quickly due to all new staff that enter the organisation, whereas OC increases slower. This is again due to that time need to be spent on communication in the internal organisation.

Time 90-100

The only change I would like to point out in this time-period is that FC is now levelling off towards a new higher equilibrium. This is the result of the individual learning potential and that the organisation is now getting used to the flow of new staff entering the organisation and the time for training that is required to turn the new staff into experienced staff.

Case #3 - Capturing competence by interaction

In Case #3, the experienced staff and the experts take time to interact with each other. This is done while working on a task, which means that interaction will not take time from task performance. At the beginning of the interaction it may take some time, but the trade-off from interacting is assumed to compensate for the loss of efficiency at the beginning of task performance.
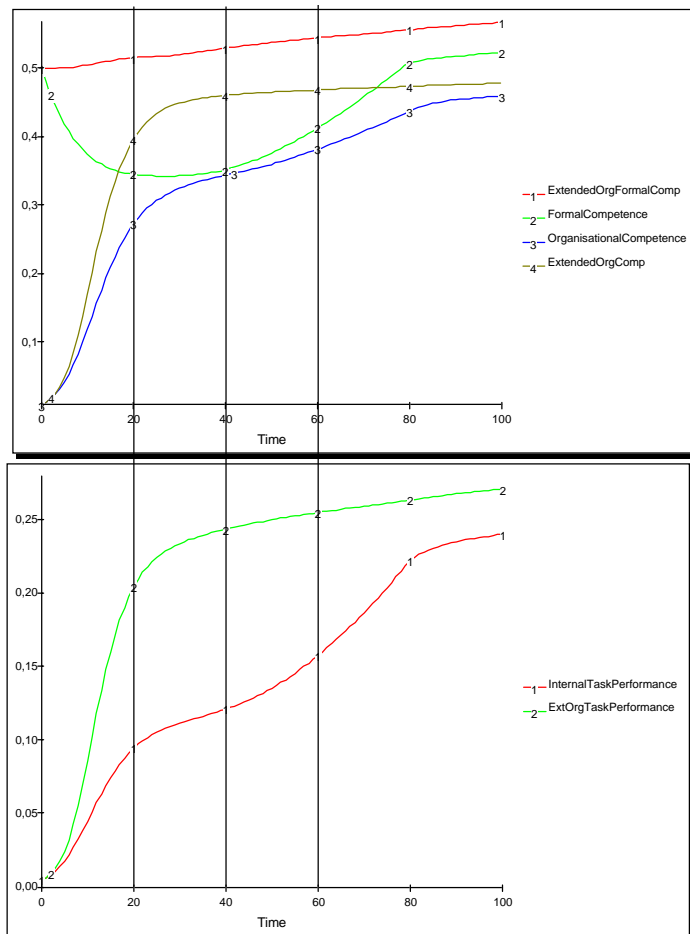
Simulation Case #3: Internal and extended organisation's staff is interacting to capture and take advantage of expert's competence.

The first time period, 0-20, shows a slight increase in all variables studied. Both the internal and extended organisation's formal and organisational competencies increase, but the effect of interaction does not seem as large as the interaction theory implies. This is due to the fact that there is a constant flow of people through both of the organisations, which means that the individuals will actually take the experiences from the interaction with them when they leave the organisation. This problem will always face organisations. It does however, as in the case with EOC, imply that if the organisations create some incentives for its staff to stay in the organisation, the competence level would increase significantly. Especially the organisational competencies will increase when synergy effects in the organisations build up. The effect of incentives on the turnover in an organisation is one possible development of this simulation model.

The effects of interaction can be seen somewhat clearer in the second time-period, 20-40, where EFC does not stay in equilibrium around time 23 the way it did in Case #2. It instead continues to increase to an even higher level. This is due to that the task profits build up at an earlier stage and the organisation therefore is able to recruit additional experts at an earlier stage than previously. This in turn increases the extended organisation's competencies further and thus brings in more profits.

In the internal organisation, OC never exceeds FC. This could be a result of that more time is now spent on interaction with experts instead of among the experienced staff in the internal organisation. Communication problems are thereby present for a longer period of time, but on the other hand result in a higher FC and OC and thereby also a higher level of ITP. The interaction can thus be said to support the internal organisation in their task work.

In the last time-period, the effect of the interaction is again rather clear. The individuals' learning potential limits the growth in FC at an earlier stage, but FC will still end up at a higher level than in Case #2.

Case #4 - Task Documentation to Capture Competence

In the final case the experts spend time documenting their experiences. The documents are then assumed to be made accessible to both the internal and the extended organisation. An intranet solution is one common way of doing this in imaginary organisations.

Writing documentation takes time from task performance and thereby also costs the internal organisation more money than interaction. The benefit of documentation is however that it becomes the organisation's property instead of the individual staffs'. This means that the resulting increases in the organisational competencies should be less sensitive to large turnovers.

The simulation shown in the graph below shows clear benefits from task documentation, both in increases in organisational competencies and in the internal organisation's profits. Interesting to note is that FC and EFC will hardly be influenced at all by the task documentation, whereas OC and EOC will be improved relatively much. This will also cause an increased ETP and ITP. These increases are especially shown in the time-period 40-80. None of the organisational competencies fall into equilibrium and OC will now exceed FC quite a bit.

EOC also approaches EFC, but it never reaches the same level. This was identified as a problem in case #2 and #3. It is important to note that the increase in this case is not due to improved co-operation between the experts in the organisation, but instead to the task documentation. The task documentation can however assist the experts in sharing and communicating their knowledge as they now are forced to put their experiences on paper.
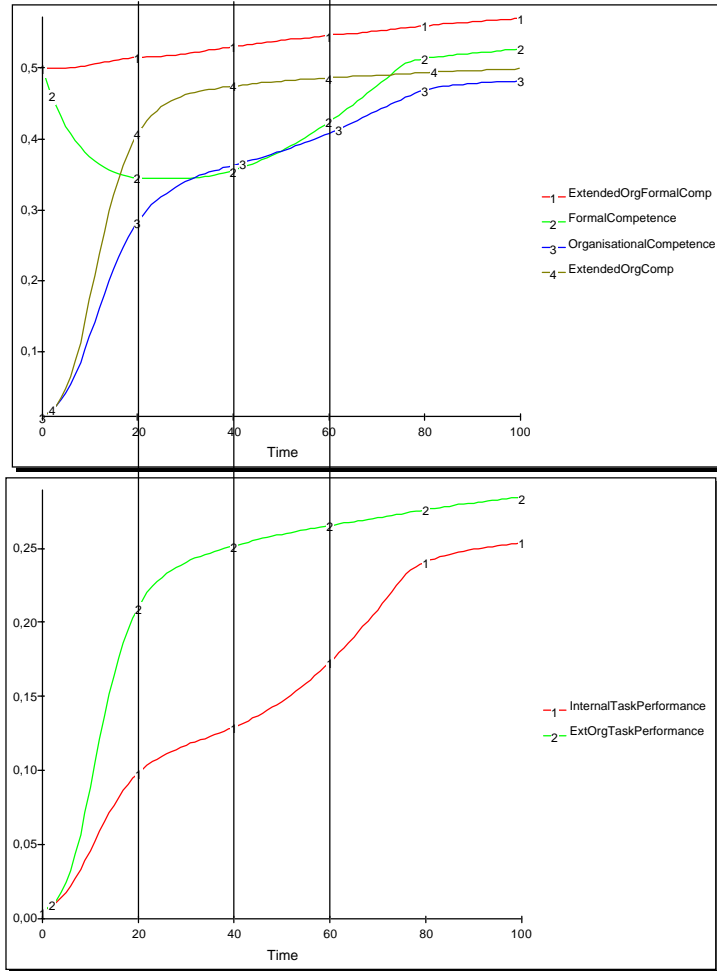
Simulation Case #4: Experts spend time documenting their experiences from task performance and make it accessible to the internal and external organisations.

Financially, task performance leads to a higher profit. It takes the same amount of time to build up a profit, but once that level has been reached (which it is at about time 23) the organisation will get a higher return on its investments than earlier. This is proved by the fact that the organisation is now able to recruit more experts and thereby also reach an even higher level of ETP.

Conclusion

As pointed out at several occasions during the analysis, outsourcing does have some considerable advantages. The simulations above show that it leads to better outcome in the form of task performance. This in turn can be seen as a long-term investment from the internal organisation. Outsourcing has financial advantages in

the long run, but it takes a while before the profits build up. The result is however higher quality products and services and thus a good basis for the build up of a stable customer base. Outsourcing could therefore be seen as creating a reinforcing quality and customer satisfaction loop.

There are however, as discussed earlier, some disadvantages that need to be taken into account before deciding to invest in outsourcing. The dependence upon the extended organisation is the major problem. In the model I test two possible policies to avoid or decrease that problem; interaction and task documentation. The conclusion of the simulation analysis above is that setting off time for and encouraging interaction between external experts and internal staff, between the master and the apprentice, leads to benefits to both the internal and the extended organisation. There are however a few implications that need to be taken into account when organisations interact and share knowledge databases.

The first is that the organisation must take into account is the turnover in the organisation. Turnover has a significant impact on the level of formal and organisational competence. In the simulations only small increases in the competence levels were noted when, in particular, interaction but also task documentation was introduced. That this was due to the turnover in the organisation is proved by decreasing the number of staff leaving the organisation (Case #5). If a large amount of time is spent on interaction with experts, the internal organisation also must make ensure that it creates incentives for the internal staff to remain with the organisation. If it does not, there is a great risk that the staff will leave the organisation and take their experiences with them. The organisation will then thus suffer from great financial and competence losses.

This may imply that the documentation alternative is a better alternative in capturing the experts competence. By requiring experts to document their experiences the documents become a property of the organisation rather than of the organisational staff. The documentation thus remains in the organisation even if the staff leaves. The problem with documentation is however that it first takes time to write and thus costs the organisation money in terms of lost time spent on task performance. It is also difficult for an individual to write down the experiences from working on a task, especially since they are often is tacit and thus inexpressible.

A third difficulty with task documentation is that it takes time to take part of. Once again this is a loss of income for the organisations. It may also be difficult to interpret the documentation and thereby to apply it to real situations. This aspect is related to the quality of the documentation. Well-written documentation can be of great benefit to the organisation, whereas a poor documentation may cause more harm than do good.

Some interesting aspects of outsourcing have been captured and visualised in the simulations and the model can therefore be regarded to be a good representative of the reality of outsourcing. Interaction and task documentation has proved to capture some of the experts' competence that is created during task performance. Other ways of capturing competence may be more efficient, but that is a discussion that I will leave to the development of this model.

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Appendix

Figure 1; Case 1 - Focusing on the relation between internal staff experience, formal and organisational competence, and task performance
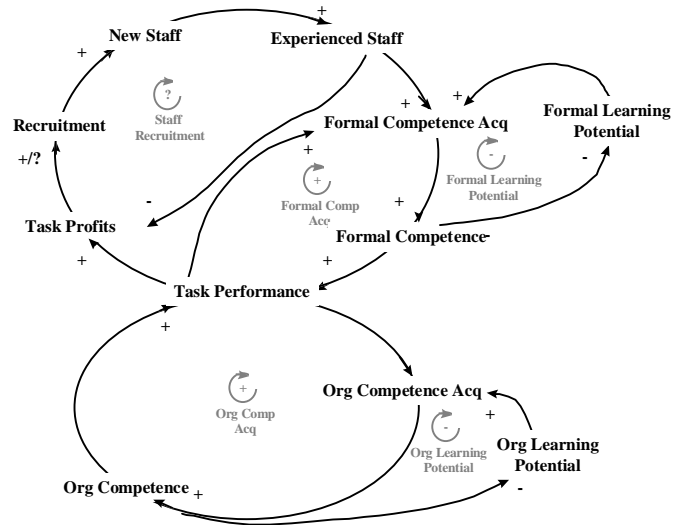

Figure 2; Case #2 - Focusing on the relation between experts and task performance
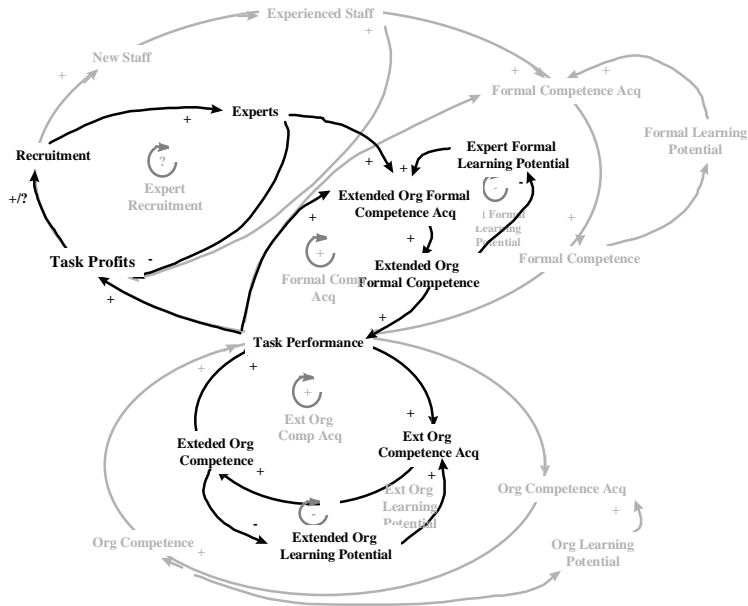
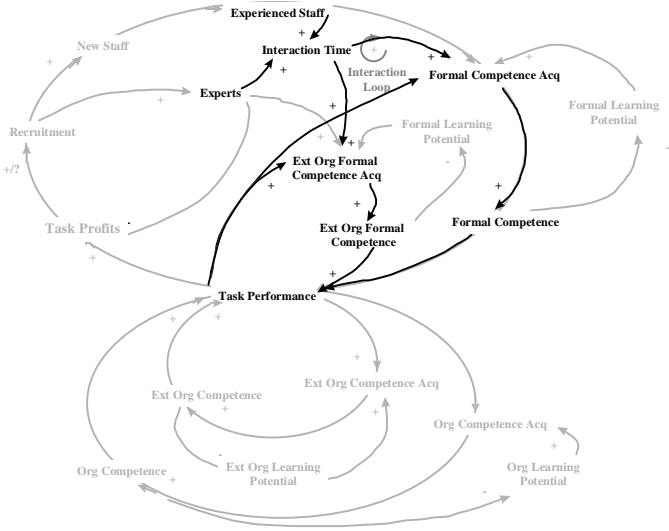Figure 3; Case 3 – Focusing on capturing expert experience through interaction

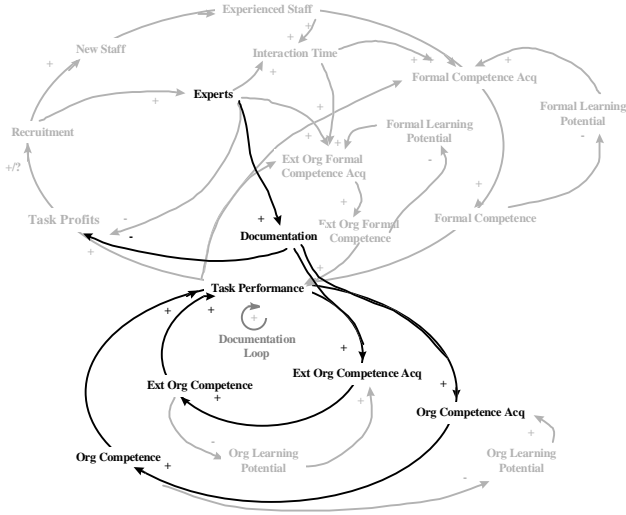
Figure 4; Case 4 – Focusing on capturing expert experience through task documentation

Figure 5: Complete simulation-model