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Importance of the Human Resources Management in a Professional Service Firm

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Abstract - In the presented work we devote to creating a computer model of a professional service firm using the theory of business modeling. The whole model was programmed using the application Vensim. Another part of this work was to use this model to answer some key questions about the professional service firms. We dealt with an issue of an optimal distribution of employees on different seniority levels. We have also studied an influence of different personnel policies on the business performance. Finally we found optimal parameters settings for a human resources management. Such model could then be used for better understanding patterns of companies in the professional service industry and we can use it to manage the company more effectively in this environment.

Keywords - *System dynamics, Business dynamics, Human resources, Management, Professional service firm.*

1. Introduction

Professional service firms are often referred to as consulting companies. This is not very accurate as they are generally companies selling their services. Consulting companies are rather the subset. When we consider taxonomy of professional service firms generated by Von Nordenflycht [1], we will focus on companies in the first and in the second group. To the first group belong classic professional service firms – characterized by a high knowledge intensity, a professionalized workforce, and low capital intensity. They are for instance law or accounting firms. The second group is called neo-professional service firms, where the high knowledge intensity and low capital intensity is also typical. Neo-professional service firms are for example management consulting companies.

In the area of professional service firms a special emphasis on a creation and maintenance of a group of developing and experienced professional staff at various seniority levels is put. This emphasis is evident, as the greatest asset of each professional service firm are actually its employees.

These companies also create a motivating and challenging environment to keep employees busy and support them in developing their skills. There is often a system "up or out" implemented in these firms. It means that each employee performance is evaluated on a regular basis, and the best are promoted and the under-performing ones "go out". This system provides a steady flow of new employees who must fill gaps left by the under-performing ones. This ensures a high quality of work and thus building a reputation, which is a guarantee for future growth. Not infrequently happens that the employees of these companies later found application in managerial positions in businesses of their former clients. This is another beneficial effect of this system and a way how to secure interesting contracts.

The main principle of operation of a professional service company is shown in the diagram “Figure 1”.

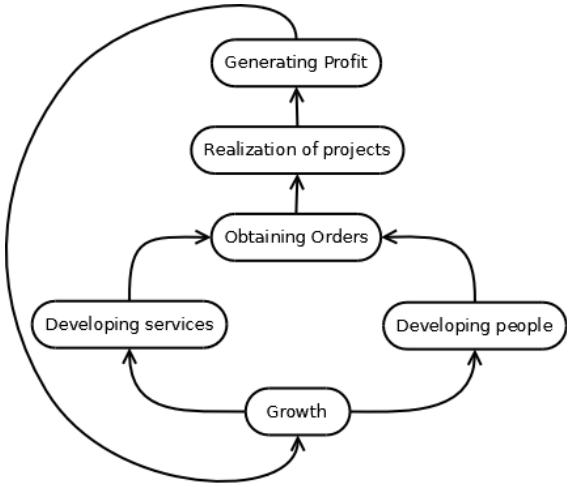

Fig. 1 Diagram of operation of a professional service firm.

2. Model

The whole model was built on basis of so called "best practices" in a professional service firms management and on the own experience with work and company culture in two companies of the Big 4. Inspiration were also publications [2], [3], [4] and management game [5].

The model and underlying difference equations are based on System Dynamics principles. We have used the Vensim modeling software [6] for the implementation of the whole model.

The whole model is built of several components representing different fields of a firm management. A component Human resources simulates, as some could expect, human resources management. A process of hiring new employees is done automatically by the model using prediction of the firm needs. The needs are computed by a component Projects. This component also takes care of projects life cycle. It means from the first proposal till a successful finish or failure.

This component is closely connected to a component Clients, holding information of an actual number of company's customers. Another component is a component simulating company reputation with the same name. It influences firm attractiveness for both its clients and employees. The component Reputation depends on a component Work quality, simulating quality of a work and employees utilization. This component is also connected to the components Human resources, Projects and to a component Knowledge base, simulating current abstract level of the company's "know-how". Bearers of the knowledge are the employees and their knowledge is gained through the work on the projects.

Another component is a small component called Services range. This component simulates some kind of variety of projects, company could solve. The wider the range is the more offers the company obtains. It is related to the components Work quality and Projects. The last component is a component called Money, simulating company's cash-flow. It does not influence any components.

This component serves only as a point for company financial performance monitoring and evaluating. For clarification of the whole model structure refer to the "Figure 2". The arrows are showing from influencing components to affected ones.

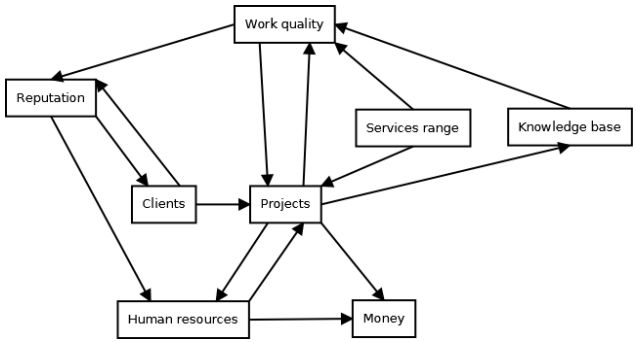

Fig. 2 Schema of model components connections.

Now we will describe the most important component for this article, the component Human resources.

2.1 Human Resources Component

As we can see in the "Figure 3", the model operates with a three-level employee hierarchy. On the lowest level there are consultants, the next level are managers and on the top level are partners. For the sake of simplicity we are not considering the supporting staff as secretaries and other employees not directly involved in the projects acquisition, realization and sale. These employees will affect the model only as a part of operating costs. Also all new hires are consultants. We cannot hire employees to higher levels. As we want to test an optimal human resources management, it is not necessary to hire to higher levels. We are not considering dismissals from over-staffing from the same reason. The employees in the model are exiting in a natural way by retirement or changing their employer.

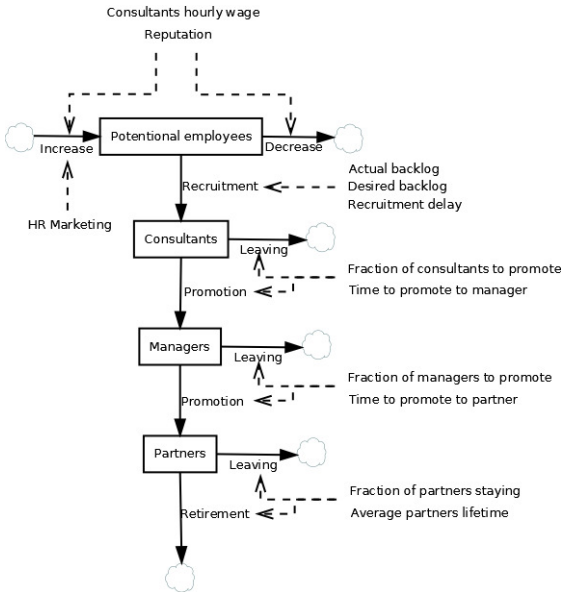

Fig. 3 Human resources component schema.

The model simulates a level of potential employees, where we are taking an attractiveness of the firm in account. The attractiveness is determined by three other variables. The first is a reputation, the second is a starting salary (Consultants wage) which is one of the parameters of the model. The third parameter affecting simulation of this level is an HR marketing, which could be set in a range from 0 to 10 where 10 is the highest level of the marketing. We are not using these parameters directly in some equations. The relation between the firm attractiveness and the consultants wage is defined through a calibrated graph. See the "Figure 4". The graph was constructed on an idea that the average consultant's monthly wage is 30 thousands CZK.

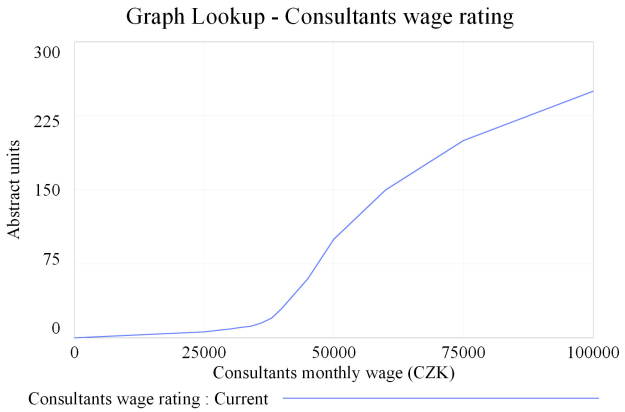

Fig. 4 Graph of monthly wage score calibration.

Both increase and decrease of the potential employees level is determined by an inflow and an outflow of candidates, computed as a function of the reputation, the consultants' wage rating and the HR marketing.

It is possible to hire new employees from this pool when needed. This need is computed by the model automatically based on comparison of a desired and an actual work backlog. The work backlog means projects that are contracted but not started yet. A typical practice is that a company holds some backlog to smooth fluctuations in a demand. The desired backlog can be set manually as a model parameter, the actual backlog is computed in weeks and so depends on an actual number of employees and an actual number and length of contracted projects. It expresses for how long time we can supply our employees to keep them fully utilized with no new contracts This part of the model was based on two publications discussing an optimal project size and an idea of the backlog, [7] and [8]. New employees are hired at the time the actual backlog is by 5% higher than the desired one and hires the number of consultants to compensate the whole difference. We will describe details of this calculation later. The new employees are not ready to work immediately but there is some delay that can be set as a model parameter. This delay in the real world corresponds to a selection process duration and consequent trainings.

Another aspect the model contains is a simulation of a career growth of the employees. The growth does not depend on the projects but on a bunch of parameters. For consultants and managers we can set a time, after which he will be promoted and a fraction, how many employees we will promote after this time. This situation is similar with the partners. The only difference is that partners are not promoted. They only stay, leave or retire. So we have two parameters here. An average time after which a partner retires. It means he stays for the whole career in the firm. The second one is a fraction of partners staying until retirement. The separation of employees to two pools – those that will stay and those that will leave is done at the time the employee goes to the specific level (consultants, managers or partners). Employees in the first pool will remain here until the time for promotion elapses and then will be transferred to the higher level (i.e. promoted). Employees in the second pool are gradually released during the time for promotion. We have used a function SMOOTH3I for simulation of the leaving employees as it has an ideal course approximating reality. Right after entry in an employment or after promotion only a few employees are leaving. The most of them leave some time in the middle and then again only some are leaving as they are expecting promotion.

Now, when we have all the main parameters and operational principles of this part of the model described, we will write about the promised part taking care of the automatic employees hiring. The computation is based on these main equations:

FC = Future consultants
FM = Future managers
FP = Future partners
C = Consultants
M = Managers
P = Partners
CRP = Consultants in recruitment process
RD = Recruitment delay
TPM = Time to promote to manager
TPP = Time to promote to partner
APL = Average partners lifetime
FCP = Fraction of consultants to promote
FMP = Fraction of managers to promote
FCP = Fraction of consultants to promote
FPS = Fraction of partners staying

$$FC = C + CRP - C * \min(RD / TPM, 1) * (FCP / 2 + 0.5) \quad (1)$$

$$FM = M + FC * FCP -$$

$$M * \min((RD + TPM) / TPP, 1) * (FMP / 2 + 0.5) \quad (2)$$

$$FP = P + FM * FMP - P * \min((RD + TPM + TPP) / APL, 1) * (1 - FPS / 2) \quad (3)$$

All parameters have already been described except for the parameter Consultants in the recruitment process. This parameter contains a number of employees in the hiring process. It means those that will be added to the group of consultants after the recruitment delay elapses. Each equation computes a future number of employees. With the future numbers we mean numbers of employees on a specific level after the time needed to get to this position after joining the firm. For example for managers it means current number of managers plus part of consultants that will ever be promoted including all those in the recruitment process minus number of managers that will leave or be promoted during the time the last consultant joining the firm reaches the managerial position.

It expresses for example whether we have a sufficient number of consultants to cover a lack of partners in the future. As we said, our model is meant for testing an optimal HR management and so does not allow hiring employees to higher levels than consultants. So the only way to cover a lack of people on some level is to grow own ones from consultants. The calculation of incoming employees to the specific level is easy as we promote after the certain time and also the fraction is specific and the calculation is done for this time. With the leaving ones is the situation more complicated as we do not know exactly how many of the current employees will be promoted to the higher level after the time needed to get to this specific position.

For example the time needed to be promoted to a manager is usually different from one needed to be promoted from a manager to a partner. In order to solve this we are using an approximation, where we assume that the promotions as well as the leaves will be even because of a different seniority and a different time spent in the firm. Another approximation is that during the time needed for promotion a half of the employees leave. This is in line with the SMOOTH3I graph course.

Using these future numbers of employees we can calculate, how many projects we can process at one moment in the future. We will start calculating the number for each seniority level separately and then choose the minimal capacity as a bottleneck.

FCPC = Future consultants projects capacity
FMPC = Future managers projects capacity
FPPC = Future partners projects capacity
FPC = Future projects capacity
FC = Future consultants
FM = Future managers
FP = Future partners
CT = Consultants trainings
MT = Managers trainings
PT = Partners trainings
MTSR = Managers time for SR
PTSR = Partners time for SR
PTC = Partners time for clients
CPP = Consultants per project
MPP = Managers per project
PPP = Partners per project

$$FCPC = FC * (1 - CT) / CPP \quad (4)$$

$$FMPC = FM * (1 - MT - MTSR) / MPP \quad (5)$$

$$FPPC = FP * (1 - PT - PTSR - PTC) / PPP \quad (6)$$

$$FPC = \min(FCPC, FMPC, FPPC) \quad (7)$$

The parameters Consultants per project, Managers per project and Partners per project determine, how many employees of a specific seniority we need for one project. Using parameters Consultants trainings, Managers trainings and Partners trainings we can set, how large part of the working hours will the employees spend on trainings and self-development.

Parameters Managers time for SR and Partners time for SR are saying, how large part of the working hours the managers and partners will spend on developing the services range. The last parameter, Partners time for clients, relates only to the partners and expresses, how big part of the working hours will they devote to building relationships with clients and searching for new ones.

Now, using the Future projects capacity we can calculate the future backlog and using it the number of projects that will be above the desired backlog in the future. It means projects that we could process if we had available resources.

BW = Backlog weeks
DBW = Desired backlog weeks
B = Backlog
APD = Average project duration
FPC = Future projects capacity
RPD = Real project duration
FP = Free projects

$$BW = B * APD / FPC \quad (8)$$

$$FP = (BW - DBW) / RPD * FPC \quad (9)$$

The Real project duration variable tells us, how long time the project really takes. We set a parameter of the model called Average project duration. The model then takes this figure, adjusts it for the motivation of the staff, knowledge and so on and calculates this real project duration.

Now we can calculate how many employees we should hire now to cover their lack in the future. We will calculate the number of consultants to cover the lack of

employees on each seniority level and then take the highest number.

DCC = Desired consultants C

DCM = Desired consultants M

DCP = Desired consultants P

CPP = Consultants per project

MPP = Managers per project

PPP = Partners per project

FCP = Fraction of consultants to promote

FMP = Fraction of managers to promote

FCP = Fraction of consultants to promote

FP = Free projects

DC = Desired consultants

$$DCC = FP * CPP \quad (10)$$

$$DCM = FP * MPP / FCP \quad (11)$$

$$DCP = FP * PPP / FCP / FMP \quad (12)$$

$$DC = \max(DCC, DCM, DCP) \quad (13)$$

The resulting variable Desired consultants tells us, how many consultants should we hire now. And so the model does. This calculation is performed each time step. In our situation each week. It means that we are checking each week, if we will have a sufficient number of employees in the future.

We will not describe the other components of the model in detail as they are not relevant for this article. For the detailed description of the whole model refer to [9].

3. Results

In this section we will describe results of simulations with different setups representing various scenarios and situations, the company can face.

After starting a simulation we have to wait for some time before the model stabilizes. The model contains many various delay functions that will start their internal counters at one time and so the results are not realistic at the beginning of the simulation. For example normally we promote consultants after a specific time spent on this position and as we hire consultants continuously in time, we also promote continuously in time. But at the start of the simulation, all employees are in the firm for the same time, so they are all promoted approximately at one time. This causes high deflections in the first years of the simulation.

3.1 Default Settings of the Model

The parameters of the model are set to nearly optimal values in the default settings simulating a mid-sized company. The company has an optimal distribution of employees on seniority levels and optimal number of them corresponding to the number of projects and clients. So the model does not need a long time to stabilize. We will use this setting as a starting point for our experiments. We will wait until the model stabilizes and then change some parameter to observe, what will happen on the resulting graphs.

Now we will look at graphs related to the human resources, representing simulation results for these stable settings. We will use the same graphs to compare various scenarios with each other. In the “Figure 5” we can see the numbers of employees on different seniority levels. The most significant group are consultants (63 - 77), managers are in the middle (32) and the smallest group is a group of partners (13), the top management of the company. This forms us a typical pyramidal distribution of employees, where there is the most of the cheapest ones, which also do the most of the work and only a little from the top management. In this graph we can also see the time needed for the model stabilization. In this case it is about 1000 weeks. Such a long time is needed because of the fact that the human resources component contains quite long delays, so the model needs long time to desynchronize them. The time for stabilization of the model is directly proportional to the delays the model contains.

The “Figure 6” shows the utilization – the proportion of the chargeable time (time paid by the clients) to the total working hours. The highest utilization have consultants (around 83%) because their job is mainly the work on the projects. Managers and partners, who have greater responsibility for sales, have their utilization lower. Apart from working on projects they also take care of a maintenance of services range, increasing of the clients’ base and so on. The utilization of managers therefore moves around 40%, the utilization of partners is only 24%.

The next graph, “Figure 7”, shows the number of currently running projects, the working capacity and current backlog. We can see that the company is working on 15 projects at one time in average. We also see that the required backlog of 9 weeks means just about 8 to 9 projects. Graph in the “Figure 9” shows annual cash-flow. From the graphs we can see that the company earns consistently around 49 million CZK per year with income

around 134 million CZK per year and expenses around 85 million CZK per year.

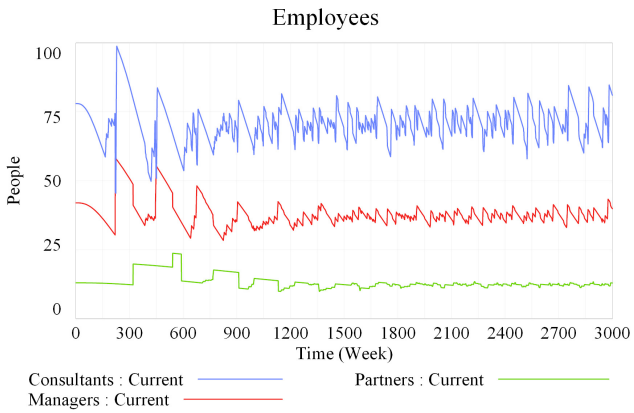

Fig. 5 Graph of employees' numbers – stable settings.

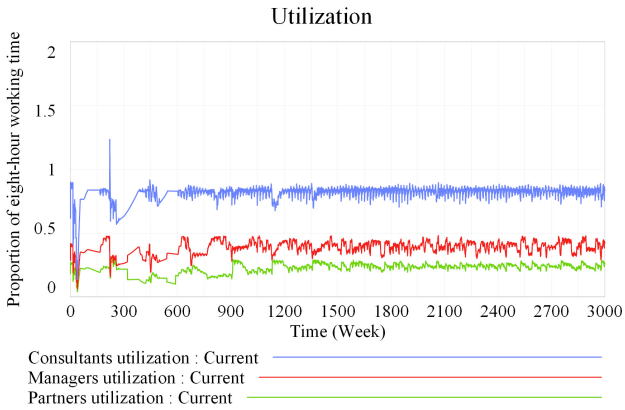

Fig. 6 Graph of employees' utilization – stable settings.

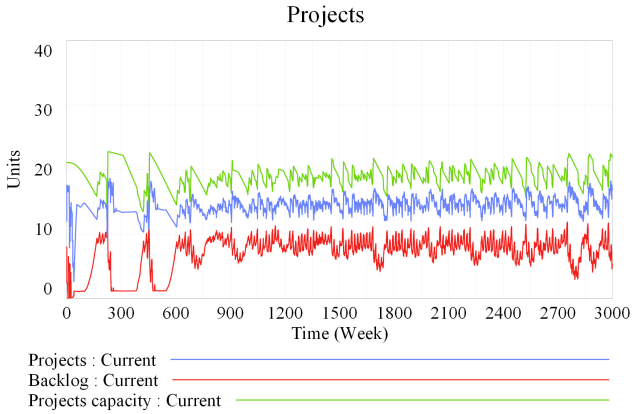

Fig. 7 Graph of number of projects, capacity and backlog – stable settings.

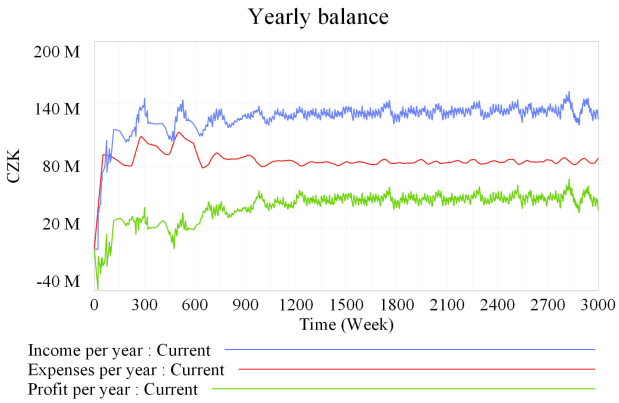

Fig. 8 Graph of yearly cash-flow – stable settings.

3.2 Simulations

One of the fundamental aspects of a prosperous company is the correct distribution of its staff on various seniority levels. As we have described in the section 2.1 Human resources component, the model is programmed so that in case of lack of staff, initiates the recruitment process. The model recruits consultants so in case of lack of managers we have to wait the required time for promotion of a consultant to a manager and similarly with the partners. In practice, of course, we can draw a manager for example from our competitor but it is not always so easy and we want to determine the exact values, how much time between promotions should we have and how many employees should we promote to have a balanced human resources policy.

There can also be the opposite problem, namely a surplus of employees on higher seniority levels. This situation did not result in an inability of processing projects but has an impact on company's costs. Employees on the highest levels have also the highest salaries and when their workload is low, we pay them at loss. The objective of this area of the company is that every employee is the busiest possible and has the highest possible utilization. So his time is paid mostly by clients through the projects.

Now we are going to prove how fatal consequences the poorly balanced structure of employees on the company profit has. We will perform this test by step changing the number of employees from the stabilized state using the PULSE function at the time of 1000 weeks. Then we will see how it will change the cash-flow of the company and how long time the model takes to return to the optimal values. In the stabilized state, the numbers of employees in this time varies between 63 and 77 consultants, around 32 managers and around 13 partners. Using our change

we will shift the numbers to approximately 63 to 77 consultants, 62 managers and 54 partners. We did not decrease number of consultants, because the reduction would have an impact on the number of projects that we are able to handle at one moment and it would have an additional impact on the cash-flow. We want to see how much the unused employees cost and how long time it will take until this imbalance disappears by natural leavings. We do not want to force our employees to leave.

A graph showing the change of employees' counts can be seen in the "Figure 9". In the "Figure 10" we can see drops of the utilization of employees and the effect of this imbalance on the weekly cash-flow chart shows the "Figure 11". In this graph we can see how long it would naturally take to correct this imbalance by immediate correction of the recruitment and promotion policies. As we can see from the stable settings, the policy is set correctly, we only gave the model imbalanced numbers of employees at the time 1000 weeks and did not change the policy.

The company will be in loss for approximately 600 weeks after emergence of the imbalances, which corresponds to about eleven years. The time until the system reaches the stability again corresponds to the turnover of the employees and this in turn corresponds to the time after which the employees are promoted. We can also think about this delay from the other side. When we have a company with bad personnel policy, it can take eleven years to fully develop the effect. It means that the momentum of the human resources is really big.

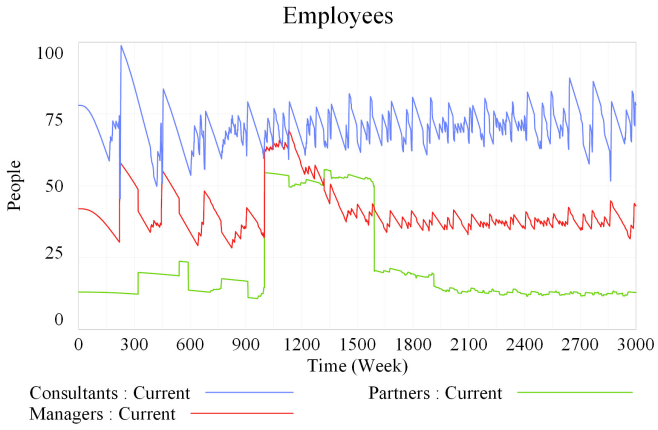

Fig. 9 Graph of employees' numbers – bad employees counts.

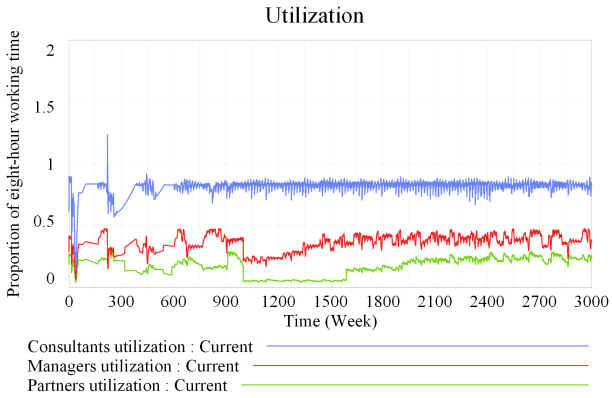

Fig. 10 Graph of employees' utilization – bad employees counts.

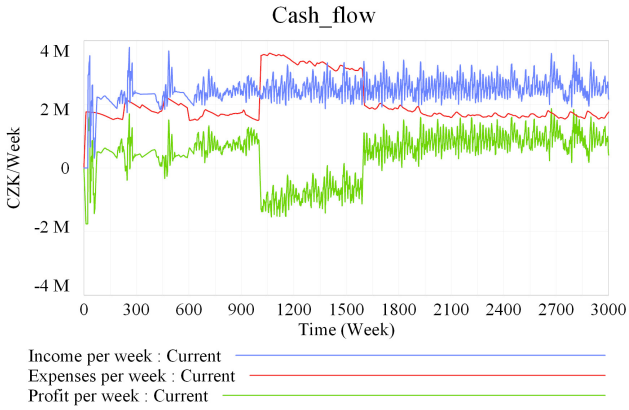

Fig. 11 Graph of weekly cash-flow – bad employees counts.

As we saw in the previous example, the correct distribution of employees is one of the key aspects of a professional service company management. The correct distribution is determined by the correct personnel policies which we will test in this section. In the area of personnel policy we set two important parameters for each seniority level. The first is, after how long time the employees will be promoted. As we know, this parameter also influences leavings of employees who will not be promoted. Another parameter is how large part of the employees of the specific seniority level will be promoted. With these parameters we can effectively control how many employees will be at different levels.

Now we will present two major errors in settings of personnel policies. First is that we promote too soon from a specific seniority level or too few employees to this level, and thus we have a shortage of staff on that level. That will slow down the projects' start-ups and reduce the utilization of the other employees' levels. We reduced the number of promoted consultants by 8% from 36% to 28%

and lower by approximately one year the time after which the managers will be promoted to partners from 320 weeks to 270 weeks. These changes were made at the time 1000 weeks, after stabilization of the model.

In the "Figure 12" the huge periodically repeated swings can be observed. These are caused by the lack of managers. The cause of these fluctuations, however, is the lack of partners, because due to the lack of managers we are not able to cover the leavings of the partners. If we do not want to hire employees to the higher levels of seniority for example from our competitors, we will have to hire at regular intervals such a huge numbers of consultants to supplement the missing part of the managers and then from these managers again compensate the missing partners. The whole swing is so great, because we have to realize that the likelihood of becoming a partner from a consultant is in this model settings 0.31 * 0.18 = 0.0504. So for 4 missing partners would need to hire about 80 consultants. Periodicity of the phenomenon is caused by the fact that we hire new employees when the actual backlog exceeds the desired one by more than 5% and then we are again waiting for the next crossing. The problem is that we have to pick up quite many consultants in order to cover the lack of partners at one time. So after the period required for promotion we will promote a part of these consultants to managers and then a part to partners. But there is the problem that they will also leave our firm around the same time. So at one point we will have to deal with a greater shortage of managers and partners again, and thus we will have to pick up more consultants again. If we were promoting to all levels after the same time, the number of consultants would be high all the time, so that they could supply the lack of employees on higher posts. But given the fact that the partners remain in the company for much longer time than the time needed for a promotion of a consultant, the number of consultants has enough time to swing back to the original level.

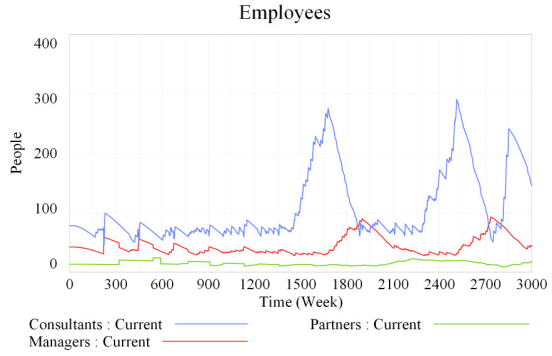

Fig. 12 Graph of employees' numbers – imbalanced personnel policy 1.

This situation obviously has a negative impact on the utilization and hence the cash-flow. Utilization graph can be found in the "Figure 13", impact on the cash-flow can be seen in the "Figure 14" that is showing the annual cash-flow. Here we can see that in times when we need to recruit consultants is their utilization the smallest. It is because there is no other use for them than waiting for promotion. In these moments the cash-flow is around zero, sometimes even in negative numbers. Hence, the company is in the red numbers. All this is caused by the small displacement of parameters from the optimal values.

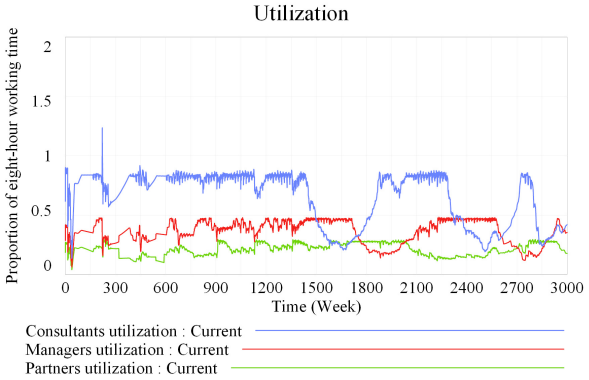

Fig. 13 Graph of employees' utilization – imbalanced personnel policy 1.

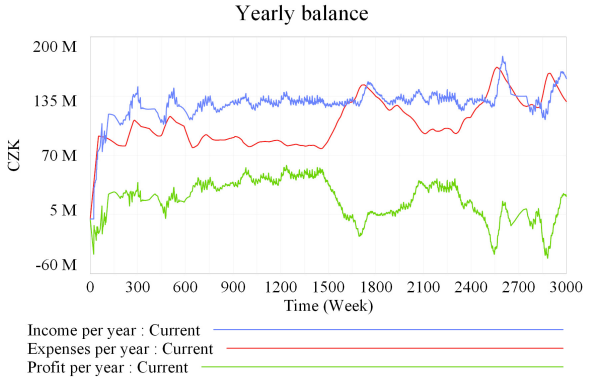

Fig. 14 Graph of yearly cash-flow – imbalanced personnel policy 1.

The second mistake is that we have employees on some levels for too long time or we promote to this level too many employees and they tend to accumulate at this level. Thus they have low utilization and the company will pay them wastefully. We have increased by 10%, from 36% to 46%, the number of consultants promoted and by 100 weeks increased the time after which we promote managers to partners from 320 weeks to 420 weeks. These changes were made again at the time of 1000 weeks, after stabilization of the model.

The "Figure 15" shows us how the change of policy at the time of 1000 weeks raises the number of managers and then begins to rise the number of partners after some time. This is due to the fact that we promote the certain percentage of managers to partners and so when their number grows, the number of partners grows as well. Looking at the "Figure 16", we can see declining managers' and partners' utilization and overall impact on the cash-flow chart shows the "Figure 17". We can see that before the change, the company was still profitable. Then the profit slightly decreases and sometimes we get into the loss.

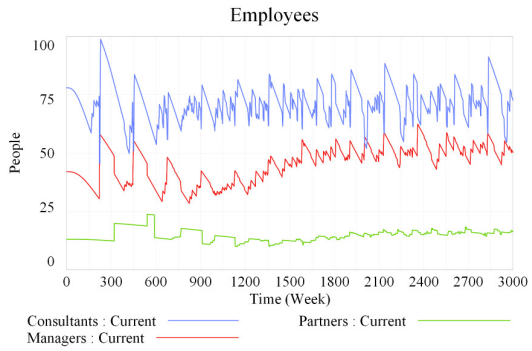

Fig. 15 Graph of employees' numbers – imbalanced personnel policy 2.

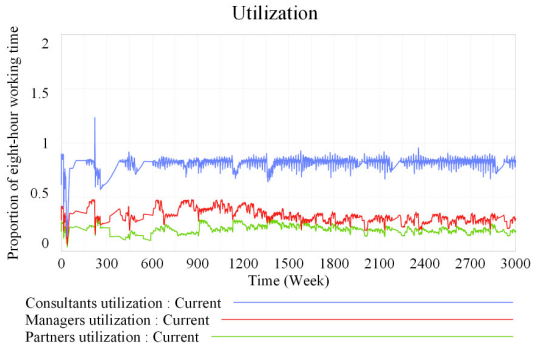

Fig. 16 Graph of employees' utilization – imbalanced personnel policy 2.

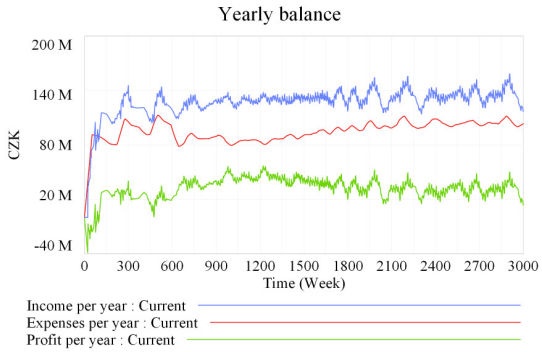

Fig. 17 Graph of yearly cash-flow – imbalanced personnel policy 2.

We must realize that here we have changed the parameters from the optimum setting again only slightly. In the real world could the personnel policy be in a much worse condition and mismanagement of this field is often one of the causes of the business loss.

4. Conclusions

Issues of the professional service companies' management are very extensive. It contains many different areas that need to be monitored, evaluated and controlled. We have to take care of the clients' base to secure a sufficient inflow of new projects. As we have already mentioned, the employees and their knowledge is essential for every professional service firm. This implicates another key area – human resources. Furthermore, we have to deal with a development of services, project management, company reputation monitoring, marketing and so on. We can realize that we have to deal with a very complex system, where it is not so easy to estimate the effect of a change in one part of the system to the rest. This is not only about the effect but also to what extent and when the effect occurs. These questions make predictions even more complicated and, in some cases, with absence of a sophisticated model, almost impossible.

We managed to create a model of a professional service firm with which we are able to simulate various scenarios and situations which a company may encounter. We have also answered some key questions in the field of corporate governance, distribution of employees, promotion times and percentages. Furthermore, the system was able to identify the key feedback loops and their key parameters that we can use to effectively manage the entire company. For the real-life model of a specific company, the parameters and internal dependencies need to be further developed to meet the size and internal policies of the company.

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