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Abstract

Governments and other policy makers use long-term planning models to support workforce planning decisions for regulating care markets and to ensure accurate balancing between care supply and demand. Our aim is to understand long-term effects of workforce planning decisions on care markets, in order to enhance health care policy making. We identify 25 key factors that influence care demand and supply based on literature analysis and analysis of a planning model for long term care development currently used in the Netherlands. We depict a model that relates these key factors together, and, ultimately construct a system dynamics model to predict long-term development of specialist care supply and demand. We conclude that long-term developments of care markets are not only determined by these 25 factors but also by dynamic interactions among three markets: (1) the specialist care markets, (2) the personnel markets in hospitals and specialist groups, and (3) the specialist training markets. Planning models must include such interactions to ensure valid long-term predictions of markets and workforce needs.

Keywords: market dynamics, system dynamics, simulation, decision support, policy making.

1 Introduction

In many countries labour market problems in the field of health care are regular items on the agenda of policy makers (Hall, 1998; Zurn et al, 2004). Governments interfere and regulate care and labour markets because free market forces don't lead to optimal balance between care demand and supply (Berende et al, 2009). A free market (no control by government) is preferable only if there is enough self-regulation of market players, and a regulated market (or even total state ownership) is required if monopolistic behavior by parties threatens societal values (Andreosso and Jacobson, 2005).

To avoid mismatches between demand of care and supply of care on national and regional levels, government agencies use workforce planning models to determine the required numbers of medical specialists to fulfill the future demand of care (Hall, 1998; Zurn et al, 2004) and to determine required enrolment numbers of postgraduate medical education programs (Berende et al, 2009). Therefore these long-term (10 to 20 year) planning models should include the key factors that influence developments in care markets and workforce markets. Long-term models must be used because it takes 5 to 10 years before enrolment decisions start affecting supply of care.

A key question is which factors should be included in planning models for long term forecasting of care market developments. If such decision support models are based on wrong or insufficient factors lead to invalid market predictions, wrong estimates of required medical specialist workforce, and over- (or under-) spending on medical specialist teaching programs (Makridakis and Hibon, 1979; Varkevisser et al, 2008; Berende et al, 2009). Current workforce planning models typically calculate future workforce needs per medical specialism based on linear extrapolations of current supply and demand of care. Current workforce planning models do not include dynamic interactions between specialists (Zurn et al, 2004; Smits et al 2010). An example of dynamic interaction between specialists is horizontal substitution; this occurs if a disease that is currently treated by (say) surgeons only, can also be treated by (say) radiologists in the future. Obviously, excluding such interactions from planning models may lead to wrong (too high or too low) estimates of required specialist workforce.

The aim of this research is to understand the long-term effects of workforce planning decisions on care markets, in order to enhance the role of IT to support decision making in health care. Our objectives are to identify key factors that influence care demand and supply, so that better decision support tools can be created. To achieve this objective, we use system dynamics modeling to identify these factors and ultimately to develop decision support systems. The structure of this paper is as follows. We summarize theory on decision making and our research model in section 2, our research method (system dynamics analysis and simulation) in 3, our main findings in 4, and conclusions in section 5.

2 Long term planning theory

In order to understand long-term effects of planning and policy decisions, different theoretical lenses may be used. Some theories focus on conditions under which decisions are taken and explain policy decision making at the individual level, like the theory of planned behavior (Ajzen,1991) and the theory of Reasoned Action (Fischbein and Ajzen, 1975). These theories focus on the influence of attitudes, norms, and conditions on the behavior (decisions) of individuals.

Our research addresses one aspect of these theories, i.e. influencing the intention of behavior by changing decision conditions by increasing the transparency of the problem domain (long term workforce needs in care markets). However, these theories address actions and decisions at the individual level. We address decision and policy making by multiple actors which implies a social perspective of decision making. Several theories address decision making and interactions among actors, like Actor Network Theory (ANT) and ETHICS. ANT focuses on how people and objects (IT artefacts) are brought together in stable, heterogeneous networks of aligned interests (for an overview of ANT in IS research, see Walsham and Sahay (1999) and Sarker et al (2006)). ETHICS is a problem solving methodology that has been developed to assist successful integration of new technologies in organizations, balancing between maximizing human gains while achieving business and technical excellence (Mumford, 1983). We do not use ANT (explaining interaction processes) or ETHICS (developing systems) since we focus on decision support and the long-term effects of decisions. Therefore, we use soft systems theory (Checkland, 1981) to address social and political elements that confound the definition and resolution of complex problems. The question “which factors influence long-term workforce needs in specialist care?” represents a soft (or wicked, ill structured) problem.

2.1 Soft Systems Theory and Group Model Building

To address soft problems, Checkland (1981) developed an iterative approach known as the Soft Systems Methodology (SSM) that consists of several steps, starting with (i) defining and understanding the problem situation (such as the nature of the processes and key stakeholders involved), (ii) build conceptual models of the system, (iii) evaluate the conceptual models to the real world, (iv) identify feasible and desirable changes to improve the situation, and (v) develop recommendations for taking action to improve the problem situation. The intention of SSM is to provide a framework for addressing ill-structured and poorly defined problem situations that contain significant social effects (Checkland, 1985).

Understanding soft problems (such as long-term workforce planning) requires analysis from multiple perspectives (Simon, 1960). 'Multi-aspect' means that the problem relates to several aspects, such as the medical care for patients, the educational capacities for the schooling of new medical specialists, the management of care organizations, the costs of medical care, the salaries of health care professionals. 'Multi-level' means that the problem can be viewed on, for instance, a national scale, a regional scale, and a local or individual scale. 'Multi-goal' means that the problem can be analyzed, aiming at various goals, such as reduction of the costs of health care, improving the quality of health care, and improving the management of care. 'Multi-paradigm' means that the problem can be viewed from different angles, such as the economical paradigm, the econometrical paradigm, the political paradigm, or the medical paradigm. Problem solving is not a very appropriate term in relation to soft problems: normally such problems are not solved by one best solution. It is better to speak of taking decisions for (a part of) the problem area. The problem is not resolved, but it is changed so that it can be handled by the stakeholders involved (Rosenhead, 1989). Decision processes for forecasting complex issues are based on bounded and political rationality (Simon, 1960; Cohen et al, 1972).

A method used for understanding soft problems is System Dynamics modelling, based on a structured simulation modelling technique (Richardson and Pugh, 1981, Morecroft and Sterman, 1994). System dynamic models are built around stock-flow structures connected by causal links and thus creating positive and negative feedback loops. Stocks or levels accumulate ‘stuff’ and can be seen as a state of a resource (workforce, demand, students, etc.) at any point in time. Flows or rates either increase these stocks (by causing inflow) or decrease stocks (by causing outflow). Crucial aspects of system dynamic models are (i) the *delays* that occur when certain flows influence one another after some time delay (increasing the number of specialist students leads to increase of specialists after 6 years), and (ii) the *feedback loops*. Reinforcing feedback loops cause destabilisation of the system after any disturbance in the loop. Balancing loops on the other hand negate out any deviation from the equilibrium state of the loop and therefore have a goal-seeking nature.

In its basic form, system dynamics analyzes positive and negative feedback loops and emerging behavioural effects –such as exponential growth or decline– that result from them. Typically, dynamic behaviour in markets manifests itself as oscillating behaviour where corrective actions force the network to a steady state but feed-back mechanisms cause delayed and counter-intuitive effects. Similar effects occur also if classical markets develop electronic sub-markets and dynamic interactions occur between the classical markets and the new electronic markets (Smits and Weigand, 2010).

Policy making for soft problems (like workforce planning for health care) is also regarded as Group Model Building (GMB) (Vennix, 1996). GMB is a problem structuring method aiming to create (conceptual and quantitative) models of the policy problem for a group of stakeholders in the policy process. Eden and Ackermann (2006) list four properties of problem structuring methods (1) use of a model as a transitional object, (2) increasing the overall productivity of a group process, (3) attention to facilitate effective group process, and (4) appreciation of the significance of facilitation skills.

Soft Systems Theory and Group Model Building hypothesise that participation of stakeholders in the decision making (policy) process will lead to better, shared solutions (policy advices) for soft problems (DeSanctis and Gallupe, 1987). We apply this theory to workforce planning in health care.

2.2 Workforce Planning Theory

Generally speaking, workforce planning (WFP) is the development of strategies to match the supply of workers to the availability of jobs at organizational, regional, or national level. WFP involves reviewing current workforce resources (supply), forecasting future needs (demand) and availability (supply), and taking steps to ensure that the supply of people and skills meets demand. At a national level, WFP may be conducted by government or industry bodies, and at an organizational level, by human resource managers (Makridakis and Hibon, 1979; WHO, 2010). In this research we focus on workforce planning at the national level.

Labour market economics (Ehrenberg and Smith, 1997) distinguishes between two modes of matching workers with jobs: hierarchical planning and distributed markets. Hierarchical planning occurs in centralized planning settings, like former Soviet-style and command-and-control military organizations. The market-based approach supports unrestricted, point-to-point matching between potential employees and employers. Hierarchical planning is based on forecasting models and sufficient information on development of care needs and care supply. Distributed markets are used to match workforce needs to workforce resources in situations where local (care) demand is well informed on the quality of local workforce offerings (Gates and Nissen, 2001).

The World Health Organization (Zurn et al, 2004) presents a framework (Figure 1) of main factors that explain the long-term mismatches between demand of care and supply of care. They conclude that valid WFP models for health care should include these factors. Zurn et al distinguish between four contextual factors (socio-demographic, economic, cultural, and geographical factors), one resources factor (financial, physical, and knowledge resources), five policy factors (non-health and health policy), and five health care system factors that determine (shortage, equilibrium, or over-supply in) health labour demand and health labour supply.

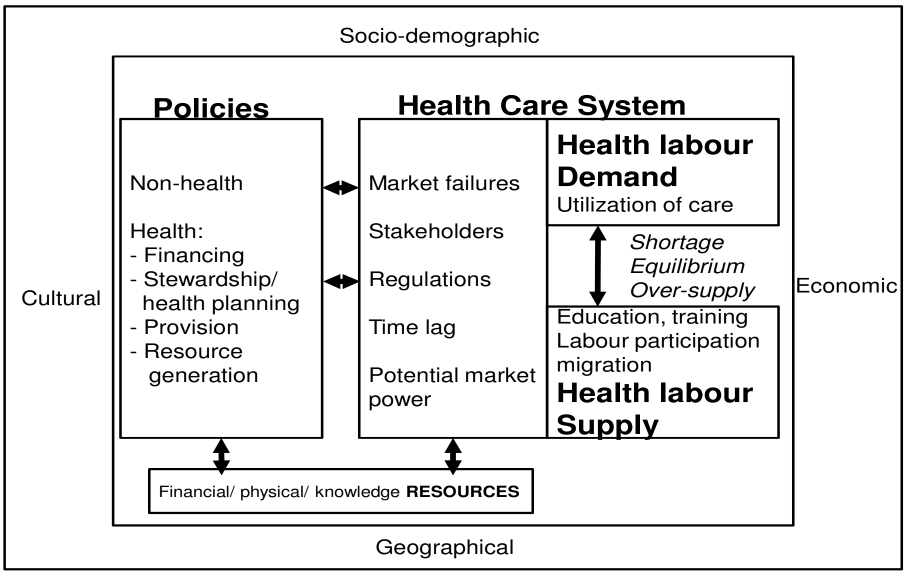

Figure 1. Framework of factors causing imbalances of human resources for health (Zurn et al, 2004)

The process of long-term workforce planning is closely linked to scenario planning. Basically, scenarios are stories about possible futures. A scenario is not a story which portrays the future accurately but it is a story which makes people in an organization think, learn, adapt, and enrich the ongoing strategic conversation, which is both an art and a science (Van der Heijden, 1996). Geurts (2000) defines a stepwise process to define scenarios for workforce planning in health care. The process starts with defining the scenario topic and time horizon (between 3 and 25 years) and identifying key internal and external factors that determine demand and supply of health care. Two of these factors must then be selected, preferably two factors with highest impact on care supply and demand and highest uncertainty. The two factors are used to design four scenarios, where each scenario is based on a combination of the future (high-low) state of each factor.

Workforce planning theory assumes that soft problems with insufficient information symmetry between consumers (demand) and suppliers (medical care), require hierarchical planning and good WFP models. Our main hypothesis is that a good WFP model (i.e. models that comply with Figure 1) and a good WFP decision process (i.e. processes that comply with scenario planning) lead to better, shared solutions (policy advices) for WFP problems.

3 Method

To understand the requirements for decision support systems in long-term planning, we analyze the long-term effects of workforce planning decisions on care markets. We use a stepwise research approach following the guidelines for system dynamics modelling and group model building given by Vennix (1996), based on Forrester (1994). This approach is based on the Soft Systems Methodology (above) and consists of (i) defining and understanding the problem domain of care markets and long-term care market development, and (ii) building conceptual models of the system (Checkland, 1985).

Our findings are based on action research in 2008-2009 by both authors, including interviews with over 20 stakeholders across the workforce planning process and extensive structural analysis of a huge Excel model that is currently used for medical workforce planning in the Netherlands. The research process consisted of four steps:

(i) Analysis of an existing model and process for long-term workforce planning for medical specialist care on the national scale (see section 4.1),

(ii) Analysis of the current markets for medical specialist care in the Netherlands (using a recent report of the Dutch Healthcare Authority (2010) on an in depth analysis of care markets and postgraduate medical education in the Netherlands, including a comparison with other European countries (see section 4.2),

(iii) Design of a new model using system dynamics modelling. The new model is based on the model from (i), including the repair of flaws identified in step (i). The model is expanded by adding factors (and care markets) found in step (ii),

(iv) Validation of the system dynamics model by doing structural validation (Peck, 2010). This means checking for model completeness (does the model contain the key factors, as indicated by well informed stakeholders and (WHO) reports) and check the model logic (does the model contain sufficient relations between factors).

System dynamics modelling has been used frequently to support management decision making for soft problems. Brailsford (2008) identified over 1500 publications addressing the use of system dynamics management problems with system dynamics in health care (Brailsford, 2008) and even more for policy modelling in supply chain management (Sterman, 2000). System dynamics modelling is a powerful, rigorous yet practical suite of methods and tools that help to analyze and predict qualitative and quantitative effects on market systems (Forrester, 1994; Sterman, 2000). In particular, system dynamics modelling helps to identify factors that influence interactions between care supply and care demand and behaviour of market participants over time.

4 Results

We first describe the structure of a workforce planning model that has been used extensively since 2000 for yearly long-term workforce planning for medical specialists in the Netherlands (4.1), then we summarize findings from the analysis of market imperfections, workforce planning, and the post-graduate education system in the Netherlands, compared to Belgium and UK (4.2), ending with a new conceptual and system dynamics model for long-term workforce planning and dynamic interactions between three markets (4.3).

4.1 Structure of a well-used workforce planning model

The Council for Medical Manpower Planning was initiated in 1999 by the Royal Netherlands Society of Medicine in the Netherlands, to predict long-term developments of available and required numbers for about 35 different types of medical specialist care in the Netherlands. The main task of the Council is to advise to the Ministry about the required enrolment of students in about 35 postgraduate medical specialist educational programs to balance future demand and supply of specialist care. Since 2000, the total number of medical specialists has grown from about 25,000 (on 14 million citizens) to about 30,000 (on 17 million citizens) in 2009. Some specialist groups have grown strongly (e.g. general practitioners), and others have grown mildly (e.g., general surgeons).

The Council has developed a very large (Excel) simulation model to perform planning calculations per medical specialism separately. Figure 2 shows the basic elements and structure of this model. The model follows a straightforward almost linear way to calculate the required numbers of students to enrol in a medical specialist training program (block 10, the only dependent variable in Figure 2). There are 11 independent variables in the model (the blocks with only outgoing arrows): (1) the current numbers of doctors (specialists), (2) the current part-time factor, (4) the current number of specialist vacancies in hospitals, (7a-7d) numbers of doctors (specialists) that exit (retire) and enter (immigration or from educational programs), (8) the future part-time factor, and (6a-6c) several scenario variables for demographical, epidemiological, social, cultural changes, and care innovation, care efficiency, and substitution of care providers.

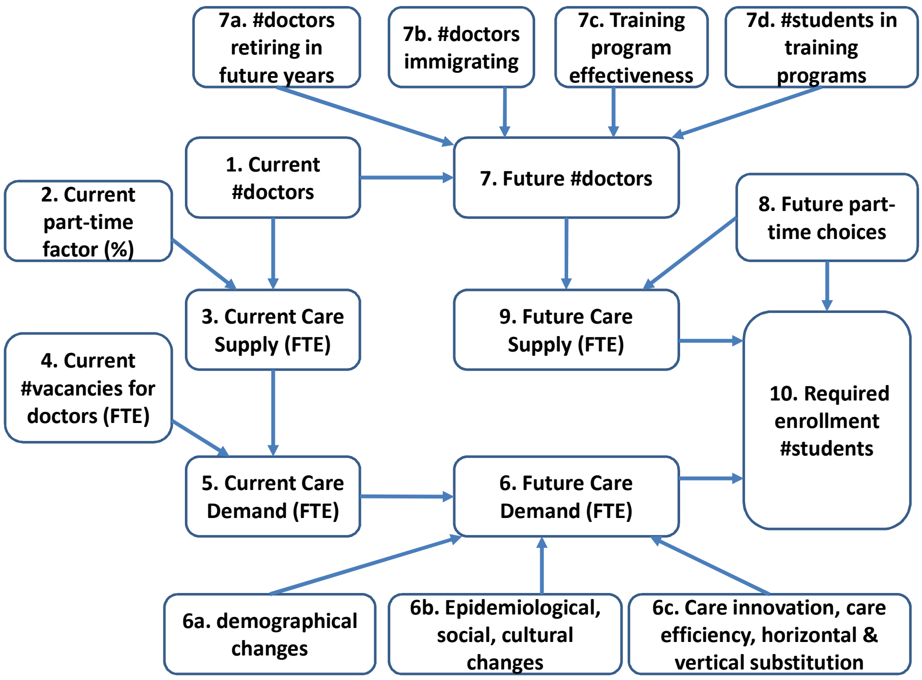

Figure 2. Structure of workforce planning model (Excel) for medical specialists in the Netherlands.

Figure 2 illustrates that current care supply is calculated as fte's, by multiplying the current number of specialists by the current part-time factor. Note that current care demand is not based on (for instance) counting the actual numbers of patients. Notably, current care demand is calculated by adding the current supply and the vacancies (fte) for medical specialists. Next, future supply and demand are calculated by extrapolating current care supply and demand by adding effects of factors 7a-7d, and 8 (for future supply) and 6a-6c (for future demand). Finally, the gap (market) between future care supply and demand is calculated as the difference in fte and used to calculate the required additional inflow of the specialist training program.

Stakeholders in the Council for Manpower Planning negotiate on the values (percentages) for variables 6a-6c resulting in low (standard) growth of demand and high growth of demand. These estimates are used by the Council to provide future scenarios and low-high estimates for required additional specialist.

Summarizing, we make the following detailed observations regarding the model in Figure 1:

- The model calculates mainly care supply over time, and estimates care demand (factor 5) by simply adding the specialist vacancies to current care supply (factor 3),
- The model determines future part-time choices (factor 8) as an independent variable, and not as a choice (dependent variable) following certain market developments (factors 6, 6a-c),
- Similarly, the model sees retirement choices (factor 7a) and numbers of students entering training programs (factor 7d) as independent variables, and not as a choice (dependent variable) following certain market developments (factors 6, 6a-c),
- The model sees care innovation, efficiency, and substitution (factor 6c) as factors influencing care demand (factor 6), where logically these factors influence care supply (factor 9),
- (Because of the previous observation:) The model cannot predict separate developments for care supply and care demand, but exclusively focuses on required enrolment (factor 10),

We make the following generic observations regarding the model in Figure 1:

- The model calculates demand and supply only per medical specialism (for each of the about 35 different specialist types), and does not take into account interactions between medical specialist types,
- The model does not include effects of specialization by hospitals and specialist groups.

If we compare the Excel model and the WHO framework (Figure 1), we see that the Excel model covers the three factors under Health Labour supply (education, labour participation, and immigration) and the time lag factor, but not the other 11 factors: the utilization of care (under demand) and the ten factors listed under policies, resources, and health care system (including market imperfections).

We conclude that models like the one used in the Netherlands over the past decade, should be extended so that more (all) factors identified by WHO are included.

Another aspect determining care demand and supply are the dynamic interactions among factors as found in research on market imperfections or market failures. These have been analysed by the Dutch Healthcare Authority (2010). We use these findings to further analyze long-term effects of workforce planning decisions.

4.2 Care market imperfections

Market imperfections are shortcomings of market structures that inhibit efficient equilibriums between care supply and demand (Andreosso and Jacobson, 2005). Market imperfections may inhibit perfect competition in the medical education market in different ways, for instance: (i) schools may choose not to offer certain specialist programs unless governments or insurance companies cover teaching costs, and (ii) specialist training programs may lack sufficient quality or innovation unless regulation of quality and monitoring instruments are enforced by governments or insurance companies.

Market imperfections may also inhibit optimal balance between demand and supply of specialist workforce in the labour market since postgraduate medical training takes around six years (which is a significant delay in the care system) before new specialists enter the labour market and so cycles may appear in the workforce supply. State planning may help to find better matching the size of the specialist workforce and the number of students finishing their training each year (Berende et al, 2009). The state in the Netherlands currently pays around 100 k euro to the training hospitals per medical specialist postgraduate student. These payments are considered to cover the net training costs. These net training costs are the balance of total (gross) training costs and the revenues from medical treatment activities done by the student specialists.

Based on the analysis of regulatory practices in health care in several countries, Berende et al (2009) conclude that states need to choose a regulatory strategy that fits the general culture of the specific market segment within the given country. So, there is not one specific set of factors to be included in workforce planning models and to control postgraduate medical education market in each country. Countries differ with respect to regulatory practice. For instance, the postgraduate medical education system in Belgium changed in the mid 1990s from market forces towards regulation, because the laissez-faire regulation strategy in the Belgium education market caused negative welfare effects by decreasing quality of treatment and increasing supplier induced demand.

In England (like in the Netherlands) the postgraduate medical education programs are regulated by the government, which heavily influences the amount of medical workforce by allocating budgets for postgraduate medical education. The decisions taken in the past ten years show in England that the size medical workforce heavily depends on political decisions, which are not taken by rational planning, but mostly by budgetary constraints. This leads to heavy fluctuations in education places and workforce for all specialties. Such fluctuations have not occurred in the Netherlands, possibly due to the long-term planning method used in the Netherlands over the past 10 years (see section 4.1). In this respect the recent shift in England towards an independent authority supervising the training market is considered a good step to create independence of education from governmental day-to-day decision making (Berende et al, 2009).

To conclude, the organisation of postgraduate medical education needs to be regulated (some degree of hierarchical planning), rather than being fully left to market forces. When analysing the set-up of this market one should consider not only economic principles but also cultural and socio-economic factors in order to determine the national regulation strategy for this sector (Berende et al, 2009; Smits et al, 2010).

4.3 Towards a new workforce planning simulation model

Based on the previous observations we distinguish three markets that determine care demand and supply, as represented in Figure 3. First, there is the Care Market consisting of about 35 specialism care (sub) markets (or groups of related specialized care suppliers) where care demand meets specialist care supply. Second, there is the Personnel Market where about 80 hospitals and around 3000 specialism partnerships demand personnel and (non-employed) specialists seek work. Third, there is the AIOS market where about 15 training hospitals offer specialist training positions in their training programs.

Imbalances in Care Market influence (1) the demand for specialist care personnel by hospitals or specialist partnerships on the Personnel Market (arrow 1) and (2) influence the ambitions of young doctors to apply for an AIOS position (arrow 2). Imbalances in the Personnel Market (and the degree state funding of AIOS positions) influence the supply (creation) of AIOS positions. Finally, imbalances in the AIOS markets influences the Personnel Market with a significant delay (indicated by the crossed arrow) of 6 years.

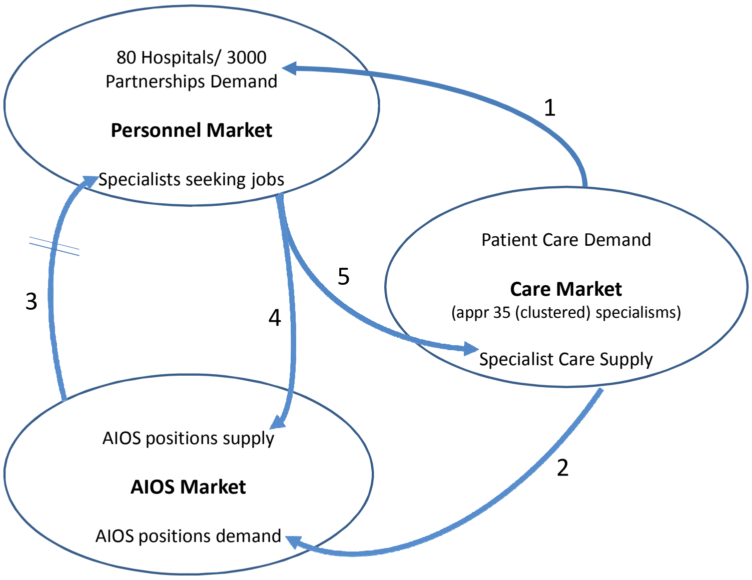

Figure 3. overview of three markets determing care demand and care supply (see text).

Note that figure 3 represents a high level perspective of workforce planning and care markets. Each market and the relations between the markets are complex dynamic systems including several feedback loops, delays, and interactions. We illustrate this complexity using the question "Who should bear the costs of postgraduate medical training", an aspect regarding regulation and stimulation of the AIOS market and the Personnel Market. Berende et al (2009) conclude that interventions of governmental institutions in the financing of postgraduate medical education programs are desirable. If hospitals have to cover training costs then a free riding problem may arise. If residents have to pay then there is a high risk that too few medical specialists will be trained due to distorted financial incentives. These problems can be solved with a proper regulation of the capital and insurance market, or by providing subsidies. The method of financing would be most effective in the form of human capital funds or subsidized loans to residents. In this way market forces remain the main coordinating mechanism in the postgraduate medical training programs.

Other questions are: "Is it necessary to centrally plan the volume of healthcare workforce supply, and if so, to what extend should the workforce supply be regulated?" To determine the right amount of medical specialists in the course of time, need-based planning may also be the instrument of choice. For countries with strong regulation in healthcare, the right amount of workforce is essential to avoid waiting lists due to shortages of specialists or supplier induced demand due to oversupply of specialists. At the same time, increased influence of the government makes the total amount of training positions dependent on political decision making and the risk of "bad" planning remains an issue. This is disadvantageous as politics tend to be myopic and usually does not sufficiently consider the long-term goals and measures that are necessary to reach them.

Figure 4 shows a more detailed system dynamics model of parts of two of the three markets identified in Figure 3. The system dynamics model in Figure 4 consists of three main parts: (i) the training of medical specialists, (ii) the care supply and (iii) the care demand. A close look at the model reveals 11 independent variables (the variables without incoming arrows) and one dependent variable "inflow of students needed for achieving equilibrium between care supply and demand".

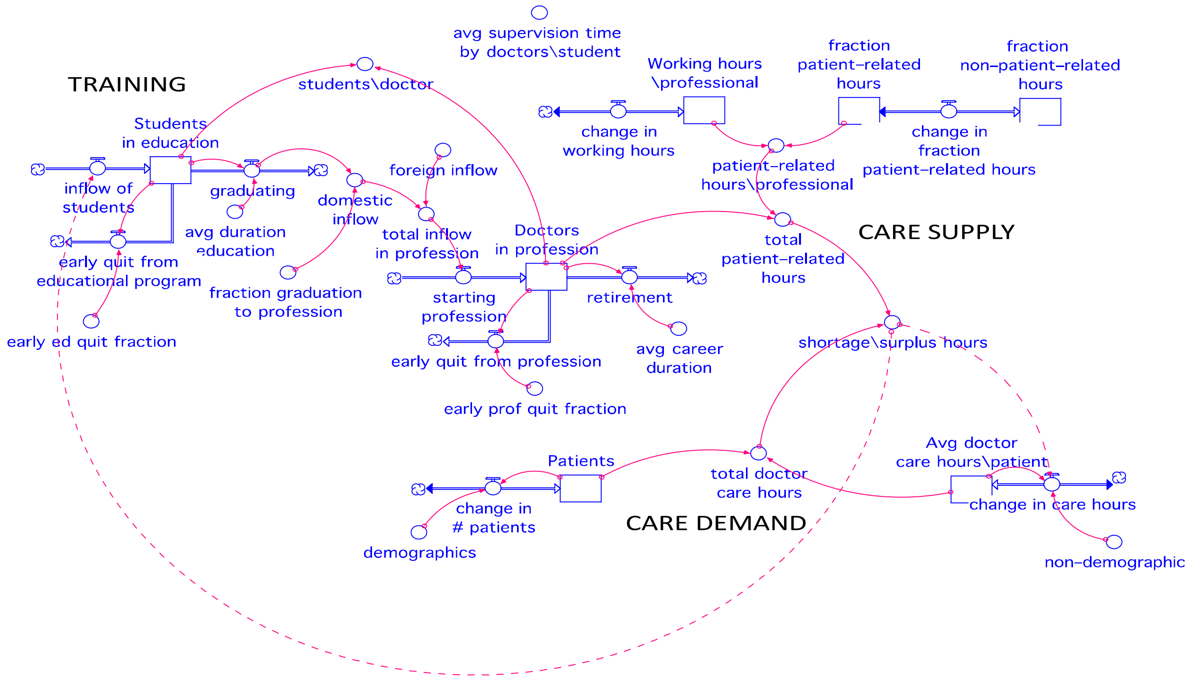

Figure 4. Example of a system dynamics model covering part of the full conceptual model in Figure 3.

Creating and working with dynamic models like the ones in Figures 3 and 4 is known to support decision making for soft problems like workforce planning in health care, as hypothesized by soft systems theory and group model building theory (see above, section 2). A useful instrument to support decision making is a management cockpit, like the one in Figure 4 (see e.g. Vennix, 1996). Independent variables (left side of Figure 4) and base values for scenario variables (bottom of Figure 4) for the simulation model are entered and lead to a base scenario output indicating the performance of the care markets (top of Figure 4). Next, policy discussions with stakeholders help to specify alternative values for the scenario variables and are used for what if scenario analysis with new performance output.

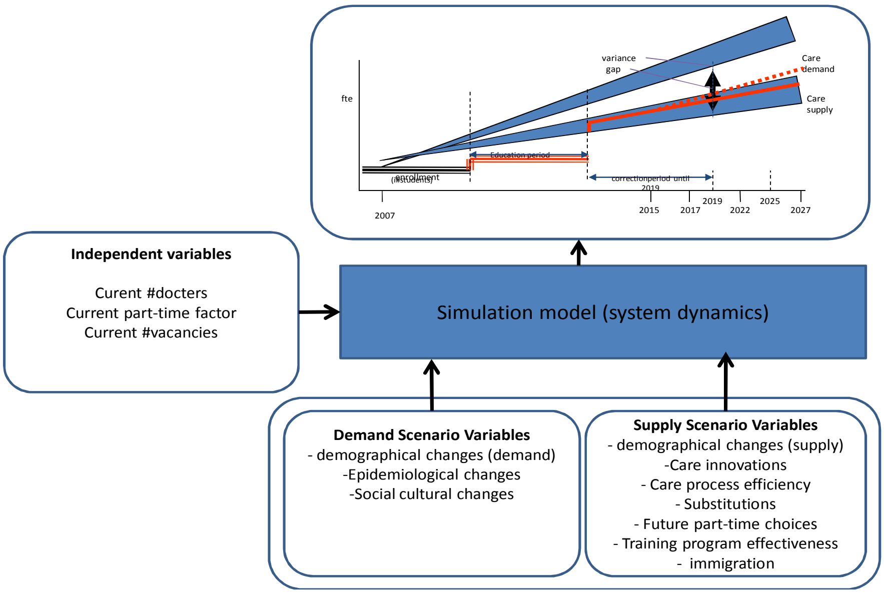

Figure 5. Example of a management cockpit showing independent variables (left), scenario variables (bottom), and simulation output (graph at the top).

5 Conclusions

The aim of this research is to understand the long-term effects of workforce planning decisions on care markets, in order to enhance the role of IT to support decision making in health care. Our objectives were to identify key factors that influence care demand and supply, so that better decision support tools can be created.

Our research contributes to the IS research domain since we illustrate the application of IT and system dynamics modeling in supporting managerial decisions and policy making. Also, by evaluating current models for workforce planning, we have identified key factors and (market) building blocks that should be included to enhance the design of new decision support systems and models.

To summarize our findings, we have identified around 25 key factors (see Figures 1 and 2) that influence care demand and supply based on literature analysis and analysis of a planning model for long term care development currently used in the Netherlands. We conclude that long-term developments of care markets are not only determined by these 13 factors but also by dynamic interactions among three markets (see Figure 3): (1) the specialist care markets, (2) the personnel markets in hospitals and specialist groups, and (3) the specialist training markets. Planning models must include such interactions to ensure valid long-term predictions of markets and workforce needs.

Also, we find that current long term planning models focus mainly on supply of care and the need for more training of specialists in one specialist market only, without accurately taking into account substitutions of care between specialist types. Finally, we find that current models do not take into account the risks of supply induced demand for care.

These findings regarding the causal structure of long term workforce planning models show the limitations of these models to accurately predict care market dynamics and a high risk of in-effective workforce planning decisions, counter-intuitive market behaviour, and market performance. We plan further research and the development of a fully functional system dynamics model and management cockpit. Policy experiments will be done to test the hypotheses in soft systems theory, group model building and workforce planning theory.

Of course, our study has limitations. We mention two limitations only. First, policy making for ill-structured problems like long-term workforce planning in health is not rational decision making only. The value of our model-based calculations of future care supply and demand should not be over-estimated. Long-term calculations can never be accurate but should be regarded as supportive for discussions, not for automating the decision process and outcome. Second, our research is based on in depth analysis of the situation in the Netherlands, with some additional international findings (data from a WHO report, and on UK and Belgium).

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