Foresight methodologies to understand changes in the labour process: Experience from Portugal

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Abstract

The foresight and scenario building methods can be an interesting reference for social sciences, especially in terms of innovative methods for labour process analysis. A scenario – as a central concept for the prospective analysis – can be considered as a rich and detailed portrait of a plausible future world. It can be a useful tool for policy-makers to grasp problems clearly and comprehensively, and to better pinpoint challenges as well as opportunities in an overall framework.

The features of the foresight methods are being used in some labour policy making experiences. Case studies developed in Portugal will be presented, and some conclusions will be drawn in order to organise a set of principles for foresight analysis applied to the European project WORKS on the work organisation re-structuring in the knowledge society, and on the work design methods for new management structures of virtual organisations.

Introduction

Foresight methodologies can be an interesting reference for social sciences, especially to understand changes in the labour process. A scenario – as a central concept for the foresight analysis – can be considered as a rich and detailed portrait of a plausible future world. It is a useful tool for labour policy-makers to identify problems clearly and comprehensively. The purpose of the foresight methodologies is the policy decision making. A labour process scenario is not the prediction of a specific future in terms of employment dimensions, qualification changes or distribution jobs by industry. It can better be considered as a plausible description of what *might* occur if some specific indicators change. In this sense, scenarios are not simulations.

Some corporations also developed scenarios and foresight methods as their planning systems became more sophisticated. For example, Shell International Petroleum Company used scenarios before the 1973 oil shock. The method proved useful in allowing Shell to anticipate the rise and subsequent fall of oil prices. In the mid-80s, this multi-national company created scenarios that focused on the future of the Soviet Union because that country was a major competitor in the European natural gas market. This kind of applications of the method are well disseminated in the economic structures, although mainly with large-sized and internationally operating firms, or with state institutions and public administration

(Ministry of Labour, Economy or Finances, Ministry of Health, central planning departments, statistical bureaux).

The labour policy analysis foresight tools can describe a possible set of future conditions. The most useful ones are those that display the conditions of important variables over time. They can be used also in some labour policy making experiences. In this article, some conclusions are drawn in order to organise a set of principles for foresight analysis. We will develop these ideas either applied to the European project WORKS on the work organisation re-structuring in the knowledge society and the futures of work configurations, or on the work design methods for new management structures of virtual organisations.

Scenarios and forecasting methods

As mentioned in the introduction, a scenario is not a prediction of specific future, although it is a method for foresight analysis. Rather it can better be considered as a plausible description of what *might* occur. In this sense, scenarios and other forecasting methods can describe events and trends as they could evolve. But they are not simulations of changes processes.

One of the main references to the topic of foresight and policy analysis is Peter Schwartz, which was a member of the Royal Dutch/Shell scenario team. He describes several steps in the scenario development process. In his main work, *The Art of the Long View,* he presents these process steps that include the following (Schwartz, 1991):

1. Identification of the focal issue or decision;
2. Identification of the key forces and trends in the environment;
3. Ranking the driving forces and trends by importance and uncertainty; selecting the scenario logics;
4. Filling out the scenarios;
5. Assessing the implications;
6. Selecting the leading indicators and signposts for monitoring purposes.

The Michel Godet approach

Another reference as an author on these methods is Michel Godet, from the Laboratory for Investigation in Prospective Studies in Paris (Godet, 1993). From his point of view, constructing a base image of the present state of a system can start the scenario development process. In his perspective, this image is described as broad in scope, detailed, and comprehensive, dynamic, and descriptive of forces for change. The delineating of the system being studied must include a complete listing of the variables that should be taken into consideration. It should also take into consideration the subdivisions of these variables (for example, the internal and external variables, as descriptive of the general explanatory labour process environment). This step is followed by a search for the principal determinants of the system and their parameters, often using structural analysis.

The scenario process involves examining the current situation and identifying the mechanisms and the leading actors (influencers of the system, through variables) that have controlled or altered the system in the past (Godet, 1993). This process continues with the development of actors' strategies. Construction of the database is then followed by

construction of the scenarios. This author combines various futures research techniques in scenario development. For example, he finds that morphological analysis can be used in scenario construction since scenarios are, in essence, a configuration of identified components.

Both futures studies and strategic management are in favour today within most forward-thinking organizations, but these two complementary research traditions have grown in logically separate ways (cf. Moniz, 2006). Godet seeks to show that there are powerful synergies between the two approaches, since all types of strategic planning and goal-setting presuppose a prior exploration of possible, probable, and desirable futures.

The frequent errors that occur in forecasting, and the noticeable absence of forecasts of crisis events, bear witness to the crisis within forecasting itself. Causes of errors include inaccurate data coupled with unstable models, lack of a global and qualitative approach, and explanation of the future in terms of the past. The future must be studied with a view to illuminating the present, which is the basic idea that inspires futures thinking, or foresight (*prospective*). "Foresight is neither forecasting nor futurology, but a mode of thinking *for* action and *against* fatalism, which supplies a key to understanding and explaining crises. In a world characterized by uncertainty and by the risk of trends being disrupted, intellectual investment in undertaking *la prospective* is more necessary than ever" (Godet, 1985).

Godet's study also includes a critique of forecasting, pluralism and complementarities. It approaches the scenarios method, identifying key variables with the MICMAC method (*Matrices d'Impacts Croisés*, a French version of the cross-impact matrix developed by Godet in 1973). The model suggested integrates the analysis of past and future plans (for example, showing why the first oil crisis was predictable), expert consensus methods to reduce uncertainty (included the Delphi technique), the SMIC method (French acronym for Cross Impact Systems and Matrices), principal concepts of strategic management, internal auditing and external assessment, and the choice of strategic options. Further on, Michel Godet reappraises the strategic planning ("The main focus of planning is not the plan, but the process of reflection and concentration which leads to it" as he mentions) and the "secrets of excellence" (citing Peters and Waterman). Finally, he points out three methodological recommendations to avoid errors of diagnosis:

1) Ask the right questions—do not hesitate to think against the grain;
2) The key to success in seeking excellence is as likely to be found in the human factor as in the technological and financial factors;
3) Consider methodologies not as ends in themselves but as tools to stimulate thought and communications.

Coates and Jarratt approach

In a book edited in 1992, Joseph F. Coates and Jennifer Jarratt, organised topics that have received substantial attention from future scientists, planners and strategic decision makers. This study entitled *The Future: Trends into the Twenty-First Century*, demonstrated the richness of approaches in futures studies.

The authors identify six streams of development in the study of the future: science and technology, military interests, business, sociology, history, and the literary tradition (science-fiction, for example). They however also underline methods to explore the future, i.e., the identification of key elements of the system being studied, the identification of driving forces toward change or to maintain stability, the assessment of the force and direction of these

trends, the development of alternative futures that include preferable visions, the consideration of "wild cards" low-probability, and the identification of appropriate actions. Coates and Jarratt point out the benefits of a good futures study: it should reveal and test assumptions, widen the scope of thinking about the future, and enable interpretation of events and developments.

Nevertheless, one knows that many forecasts eventually fail. The authors justify that on the grounds of different limitations: the existence of mechanical extrapolation of trends, or unexamined assumptions, but also problems of limited expertise and (with similar weight) lack of imagination. In the beginning of the 90's they recognised that four global trends would become more critical in the next decades: women status and gender issues, international relations, population growth, and the impact of information and communication technologies.

Classification of forecasting methods

Thus, "scenarios", as well as "environmental scanning" or even "cross impact analysis", rely on either qualitative or quantitative techniques, and are normative or exploratory in terms of their purpose (cf. Gordon, 1994). In fact, in contrast with exploratory forecasting, forecasting *tout court* can be distinguished as being normative. Normative work is based on norms or values. Exploratory forecasting explores what is possible regardless of what is desirable.

Hence *normative* uses of futures methods answer the following type of questions: what is the desirable future? What do we want to become? Decision analysis, participatory methods or morphological analysis, for instance, are explicitly normative. Conversely, *exploratory* uses of futures methods answer the question: what are the possible futures - whether they are desirable or not? Decision and statistical models, system dynamics, time series forecasts or trend impact analysis, for instance, are explicitly exploratory (cf. Moniz, 2006).

At this point we can conclude that forecasting studies are not being developed in isolation, but in the context of a labour policy-making process (as the example we are still following in this article). In most cases, they are integrated as key instruments in this type of decisional process. An exclusive emphasis on formal methods of forecasting, particularly on complex quantitative methods, will often prove self-defeating. Other authors, as William Ascher and William H. Overholt (1983), seek to do the following:

1. To locate forecasting as one logical component of the decision-making or strategic planning process;
2. To analyse the psychological and bureaucratic relationship between the forecaster and the decision-maker;
3. To identify the properties of different analytic methods in the context of different purposes and organisational settings;
4. To emphasise the importance of political assumptions in non-political forecasting;
5. To show how to interrelate political and non-political factors;
6. To offer an organisational approach to political forecasting that is systematic but non-quantitative;
7. To recommend the use of systematic scenarios and an emphasis on forecasting as heuristics, rather than an excessive emphasis on predicting discrete outcomes;

8. To describe how to present forecast results so as to ensure their maximum effective use.

Trend Impact Analysis

A few forecasting techniques enable the decision-maker (or the researcher) to include perceptions about such events, thus modifying an otherwise deterministic extrapolation, for example Trend Impact Analysis (TIA). This technique produces a range of outcomes rather than just a single value.

The Trend Impact Analysis (used mostly by economists) begins with an extrapolation of a time series. This is taken to be a "baseline forecast"; that is the future of the variable if there were no future trend-changing developments of the sort listed above. Next a list of such developments is constructed, using the analysts' imagination, the literature search, the use of Delphi method, or any other technique.

These developments might include unique technology, societal changes, employment processes, political actions or any other change that may affect the future course of the variable. Each development on the list is expressed in terms of its expected probability of occurrence over the future time interval of concern, and, where it to occur, its impact on the variable under study.

Although it may present a more realistic view of the future, this TIA technique involves great over-simplification. For example, it omits any interaction among the future events (the occurrence of one may well affect the probability of other events); the list of future events will certainly omit some that in retrospect will be seen as having been important; the variable is taken to exist in isolation but in reality will be affected by other variables.

Another means for improving the forecasts of the variables would be to include a cross impact analysis – or possibly some variation of QCA (Qualitative Comparable Analysis) of fuzzy sets analysis (but this hasn't been attempted as yet), as such techniques lay a key emphasis on the interaction or combination between variables.

Structure of foresight process

In Japan conventional Delphi method has being applied since early 70s by the Ministry of Education, Culture, Sports, Science and Technology (MEXT) in order to have a technology forecast survey and to define a science and technology policy based on long-term visions. In this sense, it was also a method of consolidating respondents' views by repeatedly submitting the same questionnaire to a large number of people. In the second and subsequent questionnaires the respondents received a feedback of the results of the previous questionnaire so that they could reassess their answers to the questions in the light of the overall trend of views. All Japanese technology forecast surveys have focused on the period running from the present-day situation to 30 years in the future.

In Germany, such exercise suffered several changes (*Futur* Programme), but in general, the structure of the foresight process there is basically the following:

1st phase: The identification of trends (Identification of general themes)

2nd phase: The reflection of trends (Discussion in expert groups)

3rd phase: The development of future scenarios (Scenario design and leading visions)

4th phase: Implementation

For example, the Federal Ministry of Education and Research (BMBF) is the institution that takes care of the national science and technology foresight analysis, and after the 4th phase new research programmes were, in fact, launched following the topics discussed: Microsystem Technology 2000+, Nanotechnology, Basic Communications Technologies, Optical Technologies and Information Technology Research 2006.

The use of various methods should be integrated in such a process, as they complement each other reciprocally, and as they may foster a continuous discussion. These methods were sufficient to develop the lead visions and scenarios, while also being stimulating for the participants. The new innovative element of this program was the orientation towards the identification and inclusion of societal needs in future research agendas (namely, labour processes). The foresight process was based on surveys or workshop panels. Taking the examples mentioned in the first chapter, one could establish a stepwise sequence for the scenario building process:

- Definition of the *scenario space.* A scenario study begins by defining the domain of interest. This can include visions and scenario topics and themes. These emerge from the identification of trends obtained by the theoretical framework.
- Within each scenario, certain *key measures* must be described. These measures include forces such as economic growth, political and legislative organizational environment, technology infrastructures, or labour market dynamics, among others.
- A *list of events* will also appear in each scenario. Of course, the probabilities of the events are different in each scenario, and for example, it can make certain policies (technological, educational, employment, etc.) more or less likely to be successful.
- Although some authors prescribe the need for probability analysis and quantitative forecasting for each measure, the contrast of implications of the *alternative futures* can be considered as sufficient.

Experiences of foresight analysis in Portugal

In recent years, foresight analysis has being applied in Portugal mostly in the labour policy sector. First, it is worth of mention the collaboration of DPP-MEPAT (Department of Planning and Forecasting, of the Ministry of Planning) with INOFOR-MTS (Institute for Training Innovation of the Ministry of Labour), for the studies on training needs in several sectors. These studies used a complex methodology to design scenarios (normally, four) based on Michael Porter and Michel Godet approaches. The interest of such exercises was the direct involvement of social partners in the discussions as well as experts.

Other cases were the application of Delphi technique in different sectors. The first one was held for the study on the socio-economical system of fisheries (MARHE project, Min. Labour, 1998-99). Here the objective was the analysis of trends on development of such system that integrates the shipbuilding sector, fishing catches, quality control and commercialization, distribution and consumption. The environment management, as well technology innovation, were creating new opportunities for the system, in spite the fact a consequent loss of jobs, mainly the less qualified ones. In order to know what are the main dimensions of such change a Delphi survey was applied in two phases, and several publications were issued from such project (cf. Moniz, A. B., Godinho, M. M.: 2000; A.B. Moniz, M.M. Godinho and I. Kovács: 2000).

Later, the study on the relation Information Society and employment (IS-Emp project, supported by DGEFP-MTS, 2001-02) followed the same methodology. The entire project was centred on the application of a Delphi survey in order to acknowledge the future relation of information and communication technologies on employment structures, either on qualification needs, or labour market re-structuration, job design, emergence of new forms of work organization, and so forth. This study used also a two-phased survey on scenario topics that were more or less important according to the opinion of the expert panel.

Labour relations and telework was a specific topic of a project that used foresight methods of analysis. It studied several sectors (metal engineering, textile and software industry), and the main questions were related to the new needs for industrial relations agenda with the emergence of tele-working forms of organization in Portugal (TeleRisk project, IDICT-MTS, 2002-03). A first Delphi round survey was developed within the project, and a second round was reported in a post-graduation thesis.

A research on the futures of the automotive industry in Portugal (WorTiS project, FCT-MCT, 2000-04) also used this same technique. This project aimed to study the working systems, the innovative work systems and new forms of work organisation in the automotive sector. Besides this aim information was retrieved that was somehow "lost" in the automobile firms, in order to analyse present concrete practices, but also how they have developed in time (and, afterwards, what potential for change they incorporate). Finally, another aim was the research on *vertical de-integration* issues, underlining the regional linkages in which automobile companies were embedded and their implications on the work systems. To achieve these aims, several case studies were done, and also a Delphi survey based on scenario topics related with the Portuguese features of this sector. A follow-up of this project will be continued in a new project recently proposed to the Ministry of Science on the futures of auto-mobility.

In Portugal, after four Delphi exercises (in the fisheries social-economical system, on information society and employment, on tele-working and on the automotive sector), just two had a two-round survey. That means that those two exercises were further developed using the same expert panel and an in-depth evaluated scenarios. This was the case for the fisheries system, and for the information society and employment linkage. The other two exercises were important experiences, but would need a further step, re-evaluating the scenarios topics with an enlarged panel. That is the case for the study on the automotive sector, where such evaluation will take place and a new exercise will be organised.

The policy action developed by stakeholders involved in those projects (ministry of Fisheries, Ministry of Labour, Ministry of Science, unions, industrial associations) was evidently based on some of the main conclusions of these foresight exercises. For instance some incentives system programmes (with the support of European funds) were designed taking into account some of those conclusions. One reason thereof could lay in the political significance of some consensual futures. The other reason is that some policy makers were themselves involved in the foresight process, and hence they have also integrated some of the conclusions in their own activity, especially in two of the above-mentioned cases: fisheries (MARHE project) and information society and employment (IS-Emp project). In these cases a national operational programme on fisheries (MARE) was integrating some of the main recommendations of the mentioned project, and the Ministry of Labour integrated in the policy agenda some of the IS Emp project recommendations. This means that to some extend the policy making strategy can use features from the foresight methods. This has been the main practice for most cases illustrated in this article.

Interest for sociological analysis of changes in the labour process

One central question can be raised at this moment: why is so important foresight to the analysis of changes in the labour process? Can this analysis continue to ignore this approach? Especially on this issue, we can answer saying that this type of sociological analysis should not ignore the foresight methodology.

First, foresight analysis can (and must) support the elaboration of technology and employment policies. This approach can anticipate trends on technology developments and, in such situation, can elucidate the bias for the employment policies (new usage possibilities of time and space in working situations, information support to decision process, de-centralised organization models, increase of automation, *flexicurity*). For the same reason, some future employment policies can determine the emergence of some technological trends instead of others (social inclusion policies, support to collaborative working concepts, etc.). In any of these cases, the anticipation of futures can be a tool to simulate situations where technology can collide with the employment possibilities and limits.

Second, the analysis of evolution trends of labour markets and qualification structures for the next decades can use those types of tools. And this can be done independently of policy design and decision, but only with scientific or academic purposes. Nevertheless, these tolls must be applied with accuracy and thoroughness.

On the third place, is of course important the knowledge of trends in the social and demographic structures to get into deeper knowledge of possible changes on labour processes. Another reason is that anticipation of value changes and collective behaviours are meaningful to understand those changes. Finally, is also meaningful the integration of social dimension in the policies of S&T, i.e., the dimension related with labour process, work organisation, learning and qualification process and job content when the technological policy development is designed. Such policies are also related with main scientific achievements, either on engineering or on social sciences.

Some examples of key-issues within a relevant time period on this relation among sociology of labour analysis and foresight approach can be further explained. One typical question is which economical weight can have the ICT in the labour activities, either in terms of employment, or in production? This means into which extend are employees using ICT for their working activities? And into which extend are investment made on equipment that incorporate ICT? Which is the situation today, and what will it be in 15 years?

Also it can be known which will be the share of that weight (ICT in employment and on production) in ICT based activities (where ICT is the *core business,* like the telecommunication sector, the electronics, the software industry), and in ICT using activities (*core business support*, like all other sectors, but specially financial and banking services, commerce, transport and logistics, automotive). Thus, is needed to know which is the relative dynamics of expansion of any of these activity sectors. Either today, or in the medium range.

But one even more difficult question is to know which activities will use the occupational competencies that still are *not* available? The difficulty is increase in the proportion of the number of years of forecasting.

Another point of view that needs also a foresight approach to the problem is the one that should know which activities can be developed having in consideration the characteristics of the labour population. Those characteristics can limit prospective developments, either in terms of shortage of qualifications (specially in the case of Portugal, where the average of

schooling among the working population is still very low), or of availability of higher qualifications (as in the case of Scandinavic countries).

What are those "inexistent" competencies and which is the due expected demand intensity, is finally a critical question for a coherent design of employment and labour policy.

Conclusions

Futures research (or future studies) is not a scientific discipline, but utilizes information from all of the sciences. Foresight is, in fact, a process of studying the future. In other words, it is the study of potential change. It can be applied either to technology, or to social relations systems.

A value of futures research is not discovering new factual knowledge as the scientific disciplines, but producing perceptions, visions and insights to that body of knowledge. In other words, the use of *foresight methodology* does not mean that one is able only to establish trends, but what is likely to make a systemic or fundamental difference over the next 10 to 25 years or more. In this sense, the interest for policy (in the field of science, or technology development, economy, employment structures or even public administration) decision-making is evident.

The future analysis, in scientific terms, is not simply economic projections or sociological analysis, or even technological forecasting. Instead, it is a multi-disciplinary examination of change, in order to discover the interacting dynamics that are creating the next generation. As Grunwald underlines, "in many fields, it is not a question of prognoses as predictions of future outcomes, but of scenarios as illustrations of *possible futures*, in order to structure the spectrum of further developments, identify 'worst'- and 'best' cases, and to gain strategic knowledge for drawing up action strategies" (Grunwald, 2004, 152).

This approach can be based on some causal chains of decisions and circumstances that lead from the present, emerging dependent variables. The display of the variable conditions can reveal the quantitative dimensions that will enrich the narrative of those "futures". Defining a large number of alternative worlds is often neither necessary nor desirable. In the final selection of "future worlds", one should consider it sufficient to present a range of opportunities and challenges. Nevertheless, this range should be small enough in number to handle. Four to five scenario "worlds" seems ideal to capture that range. The display of the variable conditions can reveal the quantitative dimensions that will enrich the narrative of those "futures". The final selection of "future worlds" should consider the sufficiency to present a range of opportunities and challenges.

The concept of "causal complexity" presented by Charles Ragin (1987, 2000, 2004) illustrates the possible use of causal analysis for the construction of scenarios, when in a relation between two variables no cause is either necessary or sufficient. Then one is in presence of asymmetric causation (i.e. when a variable leads to an output, this does not mean that its reverse leads to the reverse output), where QCA or fuzzy-set analysis can play a significative role. And here the construction of possible scenarios is a field for QCA and fuzzy-set applications. There is probably more potential for the fuzzy-set method here (instead of QCA), as it allows integrating the kind of "richer" (more fine-grained measurement) data, which is most often used in futures research.

The goal of generating scenarios is to understand the mix of strategic decisions that are of maximum benefit in the face of various uncertainties and challenges posed by the external environment. Scenario building, in conjunction with a careful analysis of the driving forces, fosters systematic study of potential future possibilities — both good and bad. This forecasting

approach enables decision makers and planners to grasp the long-term requirements for sustained advantage, growth, and avoidance of problems.

The critical aspects of the usage of such methodologies are still related with the need for an improvement of the impact of policy decision (specially, in terms of the quality of such decision). This can mean also the need to explore scientifically the synergic potential of assessment and foresight and its contribution to political sciences. Thus one main critical dimension is related with the urgent need for the creation of a "strategic intelligence" on labour market policy, that means strategic connection of several institutions operating in the field of labour market, with scientific independent units and technology development organisations. This networking must include also the local administration, social partners and, of course, the companies.

The development of prospective socio-economical knowledge has been a new topic in terms of scientific knowledge, once the prospective technological knowledge is the most interesting one in terms of policy making. That is the case for trans-national companies playing in global markets, where that knowledge is critical for their survival. Although the socio-economical knowledge is not yet taken as central one, it is being considered by experts on technology development the most important one to explain the conditions for emergence of new technological potentials or for the occurrence of unexpected obstacles and problems.

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