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Work organisation, occupational innovation and training: *The case of the physician assistant*

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7.1 Introduction

So-called matched-establishment comparisons (MEC) have been proven to be an effective research method to analyse the relations between work organization, training, and labour productivity[1]. According to Mason & Finegold (1995), MEC as a research tool allows researchers to identify links of inter-country differences at various levels. The National Institute of Economic and Social Research (NIESR) started a line of MEC research that can be considered as an important contribution to the European research on productivity. 'The Institute has long-standing experience of research on productivity issues. The studies include determinants of productivity, ranging from human resource management to regulation, and studies concerned with the measurement of productivity at the level of the individual worker, firm, industry sector, and national economy; it includes country-specific studies as well as international comparisons e.g. as cross-country productivity performance at sector level. Analyses of productivity typically involve application of a range of econometric techniques. However, the institute also conducts case studies such as for example the project that produced and analysed a harmonised database that compared the productivity fortunes of the UK with France, Germany and the US over the period 1995-2004 at the most detailed level of industry disaggregation possible' (NIESR, 2011).

NIESR is of course not the first to compare firms within an industry in different countries. Controlling for industry already implies matching, although this may be rather limited as compared to the more extensive matching attempts found in the NIESR studies in general and in the Mason & Finegold (1995) and Mason et al. (2000) studies in particular. There is no clear-cut boundary that separates MECs from such other comparisons; they jointly form a continuum that runs from 'rough matching along one dimension (industry)' to 'detailed matching along more dimensions'.

The MEC method does, however, have many advantages (Van Lieshout, 1999: p. 16). First of all, a distinct advantage lies in the focus on particular industries. By controlling for industry and fundamental technology, it becomes possible to explore both national and firm-level factors more in-depth. In addition, measuring *physical* labour productivity achieved in key jobs as well as the qualifications of the related workers, provides a substantially firmer basis for establishing the relations between qualifications and productivity than measuring a monetary proxy of productivity. *Matching* firms, thirdly, makes it possible to exclude other factors (e.g. firm size) that influence labour productivity.

Van Lieshout (1999: pp. 16-18) provides some suggestions as to further improve the MEC method. For one, one could include *labour costs* into the analysis to arrive at comparisons of productivity per Euro rather than per hour worked. Second, one could expand the analyses of firms' strategies in general in MECs, and of their internal labour markets in particular. Third, one could focus more on the role of external institutional arrangements (e.g. labour law and collective bargaining agreements) as 'ultimate cause' behind the proximate cause of work

organisation as an explanation for international productivity differences. Of course, including all those innovations at the same time into MECs would make them prohibitively expensive. But one can tailor-make an MEC approach to the sector and countries at hand.

We are currently particularly interested in the health care sector as the topic of future MECs. Healthy ageing is one of the two strategic research themes at Hanze University of Applied Sciences. Within the Healthy Ageing Research at Hanze University of Applied Sciences, 'Healthy ageing & work' is an important research theme. The related research is developed and carried out by the Hanze Centre for Applied Labour Market Research and Innovation (KCA). Besides 'healthy ageing for workers' and 'healthy ageing for the unemployed', the research focuses on the health care labour market. The combination of an ageing population and relatively small numbers of young labour market entrants will, in all likelihood, result in worker shortages in the health care sector (Kühn, 2007). Smart (more effective and efficient) work organisation can help prevent such problems.

So, our first overarching objective in this chapter is to explore whether a MEC as a research tool is applicable in the health care sector to examine differences in productivity and their relation to differences in work organisation and worker qualification. We are aware that the direct measurement of labour productivity may be more difficult in service industries in general and in health care in particular, than in industries such as the food processing and metalworking manufacturing for which MECs were previously (and successfully) carried out. But there already has been an example of the method being used in a service industry – the hotel sector (Prais et al., 1989) – so there is no reason why application to health care sectors and health care occupations would be impossible.

Besides our intent to start applying the MEC-method to the health care sector, the previous sentence also hints at another innovation we envision in applying the MEC-method. Next to focussing on *sector* comparisons, we think it may be feasible to also apply the method in *occupational* comparisons. We are keenly aware of on-going attempts to improving the work organisation in the health care sector through occupational innovation. Besides many other innovations, the development of new occupations (as well as the innovation of existing ones) is one very interesting strategy to improve work organisation in the health care sector. Prominent examples in the Netherlands (as well as other countries) are the (relatively) new occupations of nurse practitioner (NP) and physician assistant (PA). (Inter)National comparative MEC-type research on differences in (health care) work organization can help to empirically answer questions about the effectiveness and efficiency of different forms of health care work organisation, and seems therefore particularly interesting to compare (for instances) labour productivity in work settings with and without such new occupations. Historically developed national differences in work organisation offer a rich empirical variety to study; conscious attempts at alternative forms of work organisation and occupational institutionalisation enhance that variety, and its effects are particularly worthwhile to measure and explain. Our second objective is therefore to explore how MEC-type research can be applied to innovations in work organisation in general, and occupational innovation in the health care sector in particular.

Currently lacking the means to conduct an entire MEC, we set out to do a preliminary study, to explore if and how an MEC type research method could be used to explore innovations in work organisation in the health care sector in general, and occupational innovations (such as the introduction of new occupations such as the NP and PA) in particular. We focussed on the relatively new occupation (that of the PA) occupation, and exploring it in two countries (the Netherlands and Germany). Both countries are introducing and expanding the PA occupation (the Netherlands being the frontrunner by a few years),and should therefore have interest in such a study in due time.

This chapter is organised as follows. *Section 7.2* presents an overview of the new PA occupation and its development. *Section 7.3* discusses research on the implementation of the PA and productivity in the Netherlands. *Section 7.4* reports on a exploratory work In Germany. *Section 5* summarizes the results and presents some conclusions, recommendations and suggestions for future research.

7.2 The development of the physician assistant occupation

The physician assistant (PA) occupation originated in the1960s in the US, subsequently got started in Asia and is now globally spread over the world. A PA is concerned with preventing, maintaining, and treating human illness and injury by providing a broad range of health care services that are traditionally performed by a physician. PAs conduct physical exams, diagnose and treat illnesses, order and interpret tests, counsel on preventive health care and assist in surgery.

We know from American research (Hinkel et al., 2010; McCaig et al., 1998; Perry, 1977) that the employment of PAs can have positive effects on doctors' and patients' satisfaction. Productivity was also studied for the United States. A study of Hinkel et al. (2010) was conducted in 15 comprehensive cancer institutes on the productivity of NPs and PAs. The aim of the study was to examine whether NPs/PAs have the potential to reduce the shortfall of services between patients and physicians supply. The researchers' underlying assumption was that the number of NPs/PAs in doctoral work settings will increase the next 10 to 15 years. Additionally, the question in which jobs PA graduates end up becomes relevant because the impact on hospital employment might be different from other work settings in the health care sector.

In Europe, studies on PAs are generally scarce since their employment is still new, relatively scarce in health care work settings in general, and hospital work settings in particular. As outlined in a recommendation paper by the Council for Public Health (2006) to the Minister of Health, Welfare and Sport in the Netherlands, unorthodox solutions are requested to solve the upcoming employment problems of personnel scarcity. A solution might be to introduce PAs as helpers for doctors in hospitals as well as for doctors in rural areas. The occupation had been implemented, and small but growing numbers of PAs are gainfully employed.

While theoretically the innovation of a new occupation might contribute to the effectiveness and efficiency of work organisation, the proof of the pudding will of course have to be in the eating. Comparing work organisations with and without the implementation of such a new occupation will show if and how the aspired results can be witnessed. Productivity measures are a useful summary statistic for policy-makers in general and even more important in the health care sector. Estimates of productivity can identify ways in which resources can be allocated more efficiently as well as enable monitoring of activities in the health care sector. Labour productivity in health care seems of an increasing interest since results can influence decision making processes of governments as a Canadian study revealed (Sharpe, Bradley, and Meissinger, 2007).

Objective and direct measurement of labour productivity of PAs has not been done yet, let alone comparisons of productivity of equivalent work organisations with and without PAs. But some relevant research has actually been done in the Netherlands (*section 7.3*); and we ourselves did some preliminary work in Germany (*section 7.4*).

7.3 Research on PA employment and productivity in the Netherlands

In the Netherlands PAs have been educated over a period of around ten years. Educational degrees are available at bachelor and master level. A few hundred PAs are currently employed in the related field, the question arose how productive is the new profession and what can other work fields learn from that experience?

A first attempt to estimate productivity of employed PAs was undertaken in 2007 in the Netherlands by Offenbeek et al. (2007). The study focussed on three questions. First, how can doctors' work be replaced by PAs in the operating room. Second, what are the cost effects in specific wards when PAs are employed? And third, what is the influence of PAs employment on the cost structure in patient treatment settings (indicators) and how can that affect productivity?

The researchers focused on two hospitals/clinics examining PAs productivity by developing scenarios in which productivity and work context played a role. In one hospital, researchers collected data in work organisation settings where PAs replaced doctors in the operating room; the second hospital worked as the control group, with traditional work organisation settings. Offenbeek et al.'s (2007) study represents an instrument mix for data collection; it combined observations, interviews, desk research as well as using scenario techniques in the two hospitals

In both hospitals the researchers selected the ward 'Cardiothoracale Chirurgie'. The jobs under examination were determined and criteria were listed so that the differences between PAs and regular doctors jobs could be easily detected. Furthermore, the researchers used a so-called activity list during their observation to check the completeness of observed factors, the duration of the job and the accuracy of each activity. Two observers were appointed to ensure that the observation was at a high reliability level. In-depth interviews with PAs and doctors rounded off the empirical work. The collected data were analyzed at operation room level, at doctor's individual level and at hospital level, and formed the basis for scenario development.

Offenbeek et al. (2007) concluded that having a PA in a hospital operation room can bring advantages for PAs, the ward and the hospital. For PAs the appointment in such a work setting is challenging and demanding but satisfying. People in the ward see advantages when PAs are employed because they think that PAs work in a more structured and protocol-oriented work environment as well-trained doctors' helpers. For the hospital the PA employment helps to reduce labour cost while allowing a higher level of attention for patients, thus increasing patients' satisfaction. Based on their high level of education the PAs are able to take over doctor's regular routine tasks and to doctors' work load. Replacing doctor's routine tasks by PAs leads to cost reduction based on the difference in labour costs between both the doctor and the PA. One of Offenbeek's et al. (2007) conclusion was that productivity increases through PA employment are due to the fact that they can manage a higher number of patients than a doctor.

Potential problems might arise when the job description between a PA and a nurse is not clearly defined. An additional disadvantage might be that the continuity of the PA employment is not always guaranteed due to still low numbers of graduates. As PA graduates are in high demand in the labour market, there is increased competition among hospitals to recruit PAs. So a key challenge is to ensure the sustainability of PA employment in hospitals without losing the connection to nurses and doctors' assistants. In hospitals the specialization of a PA needs to be defined and an open question is where the exact threshold of responsibility lies.

Offenbeek et al. (2007) did a very thorough study, in which triangulation (the combination of different methods) strengthens its reliability and validity. For all of its strengths, however, it is not a true MEC. While observations played a role, labour productivity was not directly measured as in a true MEC, but estimated. And the number observations were limited to two hospitals – one with PA employment implemented in its work organisation, the other without PAs.

We conducted a number of interviews ourselves to further explore first experiences with PA employment in the Netherlands, as well as opportunities for future direct productivity measurement. We interviewed a program manager of a PA occupational education program, a PA employed as a lecturer, a PA working in a university hospital and a professor working in the health care sector. The respondents by and large mirrored the insights from the Offenbeek et al. (2007) study, and helped us gain insight into the potential and pitfalls of trying to achieve an MEC-type research. With the Offenbeek et al. (2007) study already providing us with some relevant insight into the employment and productivity of PAs in the Dutch case, we decided to focus our subsequent work in this project on the German case.

7.4 Research on PA employment and productivity in Germany

In Germany the bachelor of science physician assistant program is currently offered at the Steinbeis-Hochschule in Berlin, The Mathias Hochschule in Rheine (University of Applied Sciences) and at the Duale Hochschule Baden-Württemberg in Karlsruhe[2]. The standard bachelor program takes three years to complete. PAs are to be employed within various hospital settings according to their chosen specialties. Additionally, PAs are employed as consultants for pharmaceutical companies too. Physician assistants are not to be confused with medical assistants ('Arztassistent' or 'Arzthelfer'), who perform administrative and simple clinical tasks with limited postsecondary education, under the direct supervision of doctors and other health professionals. Most German PA students start their medical education with already a background of health care experience. They are educated in the medical model designed to complement physician medical training, rather than in the nursing model.

The education of PAs in Germany has only been introduced in 2006 so that few PA graduates are currently in the labour market: around 80 in 2012. This obviously prevents a Dutch-German MEC at this point in time; we will need to wait a few years until sufficient PAs are gainfully employed in Germany as well to be able to include enough units of work organisation into such a study. Their number, however, is expected to rise; Germany is quickly realizing the growing need for PAs to combat shortages of medical doctors in city hospitals and rural areas. Growing shortages of the traditional family physician ('Hausarzt'), for instance, are hoped to be combated by successfully including PA employment into the work organisation.

There is no research yet on the employment and productivity of German PAs because the occupation is still too young, and only few graduates are employed yet. Therefore, we did some exploratory work ourselves, to get acquainted with the implementation of the new occupation in Germany, and to test what type of measurement tools we will need for a future matched establishment comparison. For starters, we conducted five semi-structured interviews with experts in the field from the Netherlands and Germany. The interviews enabled us to better understand the position of a PA in Germany in hospital work settings.

Through one of the experts we got in contact with the Steinbeis-Hochschule, Berlin, and developed an (online) questionnaire for PAs asking them about their work organisation, responsibilities and the work load in terms of patient treatments. The response was 13 filled questionnaires, which gave us a first impression on the particular jobs PA graduates had found, their work hours and work load. The majority of respondents was female (10) and their age was between 35 and 45.

The survey results enabled us to find a hospital in which three PAs are employed and that was willing to give us access for a visit to do conduct interviews and observe the work organisation. Moreover, the hospital's general management gave us permission to accompany PAs for two days and observe

and interview them. We were able to observe at two wards, intensive care and oncology, on two days, and see how the PA jobs were planned and carried out. Two PAs were observed and interviewed. Furthermore, the manager of the clinic, doctors in both hospital wards as well as one doctor outside the hospital (an internal specialist) were interviewed.

Interviews were recorded and conducted as single semi-structured interviews (Miles & Huberman, 1994). Following Bouchard (1976) a checklist was used to ensure a high quality of the pursued interviews. The interview guide has been used to subsequently develop an observation guide. The entire visit, and all observations and interviews, were conducted by the researcher, who is a native German speaker. The PAs were asked to develop their own job description so that the responsible ward doctor could sign it and confirm that the PAs were eligible for doing the tasks they have described.

The average time spent for patient consults was different at the two wards. In oncology a PA has spent around 20 minutes for 'intake' patients and around 20 to 30 minutes for 'follow up' patients. In the intensive care ward the time spent for intake patients was around 10 to 15 minutes and for follow up patients around 10 to 15 minutes. Per day the number of intake patients ranged from three to five and the number of follow up ranged from two to four depending on the treatment intensity. The overall job split of a PA as a result of the interviews in the hospital was 20% for patients' intake, around 15 to 20% for working with patients , around 10% for education of new doctors , 10% treatment preparation 10%, and 30%- 40% for administrative tasks.

We tried to measure labour productivity in the health care sector by examining PAs situation and position in a German hospital. We conducted desk research and expert interviews, did a small survey, as well as collected data empirically at two wards in a clinic. This small exploratory study into the German case appears to indicate that including PAs in the work organisation increases the perceived labour productivity in Germany, just as Offenbeek et al. (2007) concluded it to do in the Netherlands. The PAs in the selected hospital contribute to a huge proportion of ward teams' outcome. The PAs work is valued; doctors and general management see the PAs as indispensable for good patient treatment, and in the wards a desires for more PAs was registered. Doctors and the general management perceived the employment of PAs an instrument to increase work efficiency and effectiveness which increases overall productivity. Comparing the two wards, the outcome is different with regard to PA jobs, the work processes concerned, and the observed labour productivity. Therefore, our research has its weakness in the limited number of observations, clearly defined objective labour productivity criteria and therefore in the usage for MECs. MECs can only be applied by having the same wards, the same working processes and the same working environment under investigation. For observations, it is inevitable to have a type of checklist with determined times for patient income, treatment and treatment exit.

Besides the potential productivity advantage in the deployment of PAs, we also found similar doubts or possible pitfalls similar to those mentioned in the Netherlands. In particular, the demarcation between PA and nurse jobs may be problematic. If PAs 'seize' the more demanding tasks, the nursing occupation might be degraded. Role distribution in an operation room is clear when a doctor and a nurse work together. This is not (yet) a given, however, when a PA is additionally included. Another caveat mentioned by a doctor is that deploying a PA may hamper new doctor training on-site.

Obvious differences in research methods between the Offenbeek et al. (2007) study and our exploratory cases study in Germany, as well as small numbers of observations in both, make it impossible to conclude anything more specific on similarities and differences between both countries at this point – and strengthen our desire for a full-fledged MEC between both countries in a couple of years.

7.5 Conclusion: towards an MEC on PA

We started our research to reach two overarching objectives. First, we wanted to explore whether an MEC as a research tool is applicable in the health care sector to examine differences in productivity and their relation to differences in work organisation and worker qualification. Second, we wanted to explore how MEC-type research can be applied to innovations in work organisation in general, and occupational innovation in the health care sector in particular.

Regarding the first question, we remain positive that it is feasible to apply the MEC method to the health care sector – as the method should, theoretically, be applicable to each and every sector of employment. But measuring productivity adequately in the health care sector will indeed be more difficult than in, for instance, metalworking and food processing industries. Measuring productivity in the health care sector challenged us from a practical point of view in various ways. Objective measurement of productivity in health care is difficult although a few attempts have been made (e.g. Hinkel et al., 2011; Castelli et al. (2007). For an MEC-type approach, in particular, various challenges await.

For one, production quality is harder to establish, and therefore harder to control for. When comparing food-processing plants, for instance, it was found sufficient for the researchers to rank cookies into three different quality[3] categories (Mason et al., 1993). The output of health care is more difficult to measure and qualify for an outside researcher. For one, health care does not 'produce' something from scratch; it tries to achieve improvement in patient health from its current (apparently problematic) status on intake to a hopefully much better state upon patient discharge. Obviously, the initial condition of a patient has an influence on the outcome of the treatment process. So one needs an assessment of the patients state upon arrival and upon completion of the treatment, a task that requires medical experience. Second, with cookies and metal pumps, thousands of units are produced within a (half) day, implying that (half) a day of direct observation at a plant is a substantial enough sample to satisfactorily assess productivity. With patients, they only receive a small part of their treatment on one day, and attributing any type of health improvement to such a small part of treatments seems impossible. This leads us to conclude that:

1. productivity cannot be observed as (purely) physical as was done in other MECS – for the aforementioned reason, and reasons of patient privacy;
2. rather than trying to measure health improvement, one should measure professional's performance of similar cure & care procedures;
3. productivity measurement will have to be in part based on administrative data from hospitals; but those data can obviously not just be the *planned* production; realised production (the time treatment actually took, and the personnel involved) reported by the professionals (as part of hospital administrative procedures, and/or as a task administered by the researcher) and checked by researchers' direct observation[4] seems to be the most attractive and realistic avenue to pursue.

Regarding the second question, we also remain positive, but the benefit of applying an MEC approach to study the effects of occupational innovation does pose additional challenges.

To begin with, when studying the gradual introduction into the labour market of a new occupation such as the PA in the Netherlands and Germany, a minimum research design would consist of 4 'cells': not only do we need matched firms between (at least) two countries, but we additionally need firms with work organisations with and without the new occupation in each countries. So we would need to either double the number of firms in each country in comparison to a normal MEC, or accept that the number of firms in each of the four cells will be lower.

In addition, the necessity of two cells per country (firms with and without the new occupation incorporated into the work organisation) makes the process of matching firms more difficult: for two countries, we ideally need four matched firms, rather than two. For instance: an emergency ward in a small hospital in the Netherlands with PAS, a similar hospital in Germany with PAS, a similar one in the Netherlands without PAS, and a similar one in Germany without PAS. Of course, there is a potential pay-off: when primarily interested in occupational innovation, a one country study comparing firms with and without the new occupation would already be interesting.

Third, timing is of the essence when studying the introduction of a new occupation into the work organisation in a certain sector. Our German cases showed that PA occupation is such a young occupation there, that it would have been practically impossible to already find a sufficient number of cases to be adequately matched both within German, and across the border with Dutch cases. Of course, if one waits too long, the study will might also become impossible, but for the opposite reason. If and when a new occupation has been incorporated into the work organisation in pretty much all firms and all their units, one would have lost the opportunity for comparisons with work organisation examples without the new occupation. So there may be a relatively short window of a couple of years ideally suited for such a comparison even within one country. And, given differences in the creation and dispersion of a similar new occupation such as PA in different countries, this window will be even smaller for international comparisons, and become smaller with each additional country to be included.

Fourth and perhaps foremost, the unit of analysis in an MEC focussing on a new occupation is crucial. One cannot simply focus on the work of employees employed in the new occupation. Particularly with new occupations, what tasks employees actually perform will vary between different firms within a country, and even much more so, across national borders. Given the fact that one will compare work organisation in settings with the new occupation with work organisation in settings without them, there has to be a clear demarcation of the tasks to be studied in all units. In firms where the new occupation has not yet been introduced, similar tasks will be performed by employees in other occupations – in the example of the PA, by doctors and nurses.

Despite all these additional challenges, the expected benefits of such a study warrant tackling them. The introduction of a new occupations such as PA is an innovative approach in a tightening European labour market that can help prevent or reduce employee shortages. Comparative results on such innovations in different countries are a promising line of applied labour market research than answers relevant scientific questions, as well as results in findings that can be directly applied into the work organisation by firms and other actors in such a sector. So the expedition seems worthwhile; but the challenges that await, will require a substantial intellectual and financial investment.

Notes

1 Cf. Van Lieshout (1999) for an overview.

2 See: http://www.physician-assistant.de.

3 Quality refers here to the complexity of production (and obviously not to the taste), ranging from simple undecorated cookies to more complex (filled or chocolate-coated) cookies.

4 Following Offenbeek et al. (2007), simultaneously using multiple observers would be preferable, in order to enhance the reliability of the observations.

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