

Issues in health services delivery

Skill mix in the health workforce

Discussion paper
3

Determining skill mix in the health workforce: Guidelines for managers and health professionals



Evidence and Information for Policy
Department of Organization of Health Services Delivery
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Discussion paper No.

Skill mix in the health workforce

*Determining skill mix in the health workforce:
guidelines for managers and
health professionals*

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Introduction

Most health systems are coming under increasing scrutiny with a view to cost containment, often as a direct or indirect result of health sector reform. Health care is labour intensive, and the level and mix of staff deployed is a central element in determining the cost of care and the quality of care. It is important that managers and health professionals in any health care organization strive to identify the most effective mix of staff achievable within available resources and organizational priorities.

This report builds on the work already undertaken for WHO in this area, which developed a typology of approaches to skill mix (Buchan, Ball & O'May, 1996; see also Buchan, 1999). It examines the context in which decisions on skill mix are made, drawing from country case studies, and provides practical guidelines for health professionals and managers.

The report aims to:

- Highlight the different approaches to making decisions on skill mix, giving examples for each approach;
- Outline the contextual, political, social and economic factors that play a part in the decision-making process for determining skill mix;
- Illustrate the reality of determining skill mix by highlighting the pragmatic application of theory and the impact of contextual factors, drawing from country case studies;
- Develop a framework for decision-making, which will assist in identifying which approach or approaches are most appropriate, given the main objectives of managers, the availability of data, the characteristics of the organization, the staff groups involved, the time-scale, etc.;
- Draw from the typology and the case studies in order to develop guidelines for managers and health professionals who are involved in determining skill mix; and
- Stimulate and encourage further research on skill mix in context

The report is intended as a support tool for managers and health professionals who might be interested or involved in skill mix. **Section I** presents the general lessons from published research on **skill mix in theory**. It examines a conceptual model, and outlines eight different approaches to skill mix. These approaches are not mutually exclusive; organizations will often use a combination of the different approaches. However, it must be noted that most research is limited in focus, often weak on methodology, and may not be replicable in a specific context. Also, most research on skill mix has been done in the United States and, is therefore, relevant to that particular context.

Section II focuses on **skill mix in context**. It highlights the importance of the organizational and system context when assessing which, if any, approach(es) to skill mix may be appropriate for specific requirements.

Section III provides guidelines on **skill mix in practice**. It will help decision-makers determine which approach(es) to skill mix can or should be implemented. It highlights the four stages in the skill-mix cycle: evaluating the problem; identifying contextual

constraints; assessing resource availability; identifying and implementing an approach. The **Annex** provides a detailed description of the eight different approaches to skill mix.

1. Skill mix in theory

This section outlines the main approaches to determining skill mix, and highlights the major implications of previous research in this area.

Many health systems around the world are coming under scrutiny for cost containment and quality improvement, often as a direct or indirect result of health sector reform (Buchan and Seccombe, 1994; Kolehmainen-Aitken, 1998). In such a situation, the level and mix of staff deployed to deliver health care becomes a central element in the cost of care, and a major determinant of the quality of that care. Health care is labour intensive, and the cost of labour accounts for a high proportion of total costs (often 75% or more). Managers and health professionals are thus striving to identify the most effective mix of staff achievable within available resources.

What is meant by 'skill-mix'?

In practice, service providers can respond to the need to 'decide on the best mix', by using one or more of a range of methodologies (as outlined in Section I). Why does the same challenge of determining skill mix produce different approaches? One reason is that there is a great deal of variation in what is meant by 'skill mix' or 'personnel mix'. The term 'skill mix' can refer to the mix of posts in the establishment; the mix of employees in a post; the combination of skills available at a specific time; or alternatively, it may refer to the combinations of activities that comprise each role, rather than the combination of different job titles.

Where does the term 'skill mix' come from? It is a term that seems to be used exclusively within a health service context, and yet other organizations and businesses are as likely to want to ensure that they have the most cost-effective combination of roles and staff to meet their needs. The health-specific label of skill mix should not prevent consideration of current practice in change management and resource planning in other sectors as well.

Developing an approach to skill mix requires a broader vision of resource planning, in order to help map out the issues and the methods that can be used to tackle them. The danger is that a 'skill-mix review' can become a stand-alone exercise, not linked to other initiatives and organizational developments. This can lead to duplication of data collection, or results can be made redundant if other far-reaching initiatives, (such as reorganization) have staffing implications of their own.

The reason for the existence of different skill-mix methodologies is thus partly due to the various understandings of skill mix and to the different types of problems that prompt service employers to review skill mix. Using a medical model, these can be regarded as the 'presenting problems', that is the set of symptoms that a patient presents before a diagnosis has been made. The 'presenting problems' act as the drivers for reviewing the mix of staff. For example, the prompt for looking at the staffing mix of a clinic may be the inability to recruit medical staff into vacant posts. The focus of this skill-mix review would be on exploring alternative staffing solutions, that is, on the redesigning of roles to fill the gap caused by a shortage in supply of medical staff, or on job substitution. On the other hand, a new approach to care organization may have been introduced, such as 'patient focused care' or 'primary nursing' which acts as a catalyst

for reviewing the mix and roles of staff. In other words, skill-mix research is used to solve a variety of quite different problems.

Taking the medical allegory further, an effective remedy requires an accurate diagnosis, so that the root problem is treated, not just the symptoms. Thus, when thinking about the drivers for skill mix change, it is necessary to think beyond the obvious problems as they present themselves, and to examine the root causes of the problems. It then becomes possible to identify whether a solution can be found at this more fundamental level. To return to the example above, it is necessary to consider whether the staffing shortage is a national or local phenomenon. If local, what were the factors leading to a shortage of that staff group? Could anything further be done to address these problems?

1.1 Approaches to skill mix

Staff mix can be examined within occupational groups, or across different groups, such as nurses and doctors (Vargos-Lagos, 1991; Bhopal, 1994). These approaches can be categorized as adopting a mainly quantitative or qualitative approach (see, for example, WHO, 1990). Eight approaches used in reviewing and determining skill mix were identified in the analysis of research on the subject. Table 1.1 shows the key characteristics, strengths and limitations of each approach. They are discussed in greater detail in the Annex and in Buchan (1999).

1.2 Limitations of research on skill mix

The research commissioned by WHO examined skill mix and cost effectiveness (Buchan, Ball & O'May, 1996). A total of 473 publications were identified. The following are the main lessons derived from this review:

- The vast majority of published studies are from the United States, and focus on one of two areas of skill mix — skill mix within nursing, or skill substitution of nurses for doctors. The utility of published studies is often constrained by incomplete reporting, and by methodological weaknesses;
- Most of the studies do not explain why a particular approach to skill mix was chosen, and give insufficient information about the organizational context in which skill mix decisions were made;
- Most studies do not provide appropriate evaluations of quality/outcome and cost to enable any evaluation of skill mix.

The eight approaches outlined in Table 1.1, and discussed in the Annex, represent the main methods used by health care organizations to review the mix and level of personnel. Each approach has its pros and cons, and often more than one method will be used in combination.

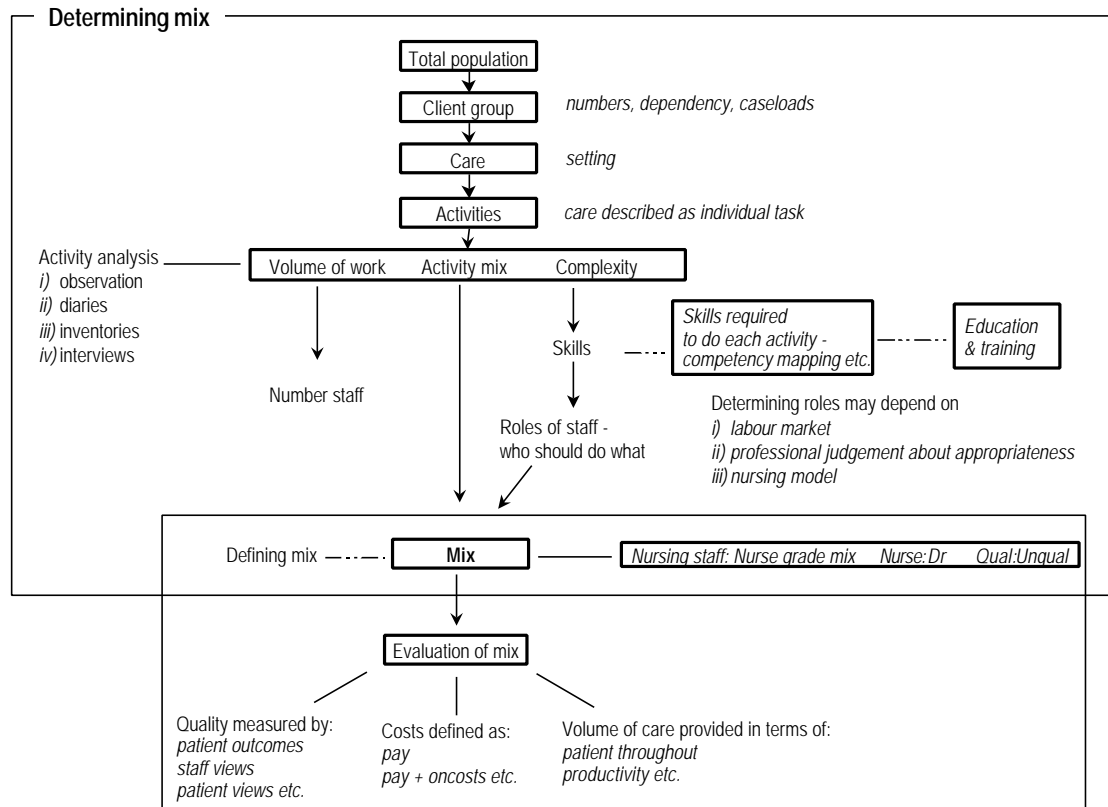
Table 1.1 Main approaches to determining skill mix

Approach	Methods	Strengths/weaknesses
Task analysis	Frequency and cost of 'task' elements of jobs identified. Skills and knowledge required for agreed 'tasks'; used to profile staff and identify gaps	Reliance on trained observers (costly; problematic if no agreement of skills/knowledge required). Task-based approach criticized because it focuses on the "measurable"
Activity analysis/ activity sampling	Activity performed by each staff member recorded by observers at predetermined intervals, for agreed time period. Frequency of different activities/time required identified. Data analysed, used as basis for reallocation of activities/tasks to staff	Quantitative approach can be used as basis for discussion and debate. Observers can be expensive; difficult approach if workplace is not a 'fixed' ward or unit; danger that if staff are not involved they will not accept results
"Daily diary"/ self-recording	As above, but staff record activities	Can overcome cost implications of using observers (<u>but</u> has an opportunity cost). Staff may not provide accurate details. Strength is direct involvement of staff
Case mix/patient dependency	Patients/clients classified in groupings according to diagnosis or dependency. Formula is used to relate "scores" to staff hours required	Uses mix of qualitative and quantitative methods. Benefits can include determining variations in staffing over time to match changing workload. Gives only overall numbers of staff; further work required to determine mix
Reprofiling/" re-engineering" ("zero-based")	Detailed analysis of current mix, activity, skills and costs. Working group considers alternatives within available resources; aim is to achieve 'ideal' mix	Often radical and fundamental. Rarely applied in full, because of organizational/political constraints. Danger of becoming a "wish list", with less focus on "how to get there"
Professional judgement	Staff/management in work area assess current activity and staffing, review data available, apply collective judgement to reallocation of work	"Low tech" approach; involves staff, can be quick. Constraints are possible lack of transparency/objectivity; possibility of little change
Job analysis interviews/role reviews	Detailed individual or group interviews; can include critical incident technique; repertory grid	Structured approach, if interviewers are skilled, can reveal much relevant information. Involves staff. Main problems are potential for bias and lack of objectivity
Group discussion/ "brainstorming"	Facilitates workshop/discussion group of staff to identify issues requiring change. Use of available data as basis for discussion	Can be quick – often used as 'diagnostic' phase of other approaches. Involves staff. Requires skilled facilitation; raises expectations and can generate mass of contradictory information

Note: See annex for full details of these approaches

A conceptual model was developed to enable the researchers to identify different possible components of skills-mix projects, that are covered in the literature (see figure 1.1). The model was used to classify the published research according to the focus of data collection, such as workloads, patient dependencies, skills and competences, and roles. It provides a framework for thinking about skill-mix research.

Figure 1.1 Conceptual model of personnel mix



It must be emphasized that a distinction must be drawn between the pragmatic and practical approach — necessarily adopted by many employing organizations, because of resource limitations and time constraints, and the “ideal” approach — dictated by a research study — where a certain distance from day-to-day organizational priorities is required. In an ideal study, the effectiveness of a particular skill mix of health workers would be defined by its costs, and by the effect it has on patients’ outcomes. There are several reasons why this ideal approach virtually never happens in practice.

First, it is often difficult to identify suitable indicators of patient outcome. Secondly, patient outcomes are affected by a wide range of factors, aside from the care provided by any specified group of health care personnel. It is extremely challenging to determine the effects of one group of staff while controlling the effects of others. Thirdly, comparing the outcomes produced by one skill mix with those produced by another demands an assiduous application of controls. It is extremely problematic to control adequately for the huge number of variables (related to patients, staff, interventions and the environment) that are likely to influence patient outcomes.

Because of the problems associated with using patient outcomes, indicators of quality of the care provided is often used as a proxy for outcomes. Although this has its limitations in that it is a process indicator, not a measure of output, it has the advantage that the quality of care provided by specific staff groups can be measured.

Quality/outcome measures is one data requirement for assessing skill mix. The other is staff costs. These are both direct and indirect (e.g. in terms of an assessment of the impact of change on staff motivation). Most studies which examine skill mix rely only on a measure of direct costs using wage data – and in some cases, this is average rather than actual data. For a complete picture of costs, an assessment will also be required of retraining and redeployment implications. Where “before and after”, or comparative evaluations of costs are being undertaken, a reliance on wage costs as the cost indicator will make the evaluation highly sensitive to the differentials in wage levels between groups of personnel; these differentials can vary markedly between employing units, health-care systems and countries and across time. If a wage differential between a doctor and a nurse is 5:1, the potential cost savings of substitution may appear much greater than in a system where the wage differential is 2:1.

Aside from the methodological weaknesses there is a more fundamental reason why general conclusions cannot be drawn from the available research on skill mix. The results of each published study only remain true for the time and place from which they are derived. In short, reported organizational approaches to determining skill mix will often use one or more of the eight methods outlined in Table 1.1, but in a context where achieving change is the main priority, not ensuring research “objectivity” or methodological rigour.

This theme will be examined further in the next section, which assesses approaches to skill mix against the backdrop of the contextual factors that have an impact on the health care organization as an employer.

2. Skill mix in context

The previous section described the range of skill mix methodologies that are available, and touched on the limitations of the literature on skill mix. The key problem identified was the tendency of published reports to describe a specific methodology (such as activity analysis), rather than an entire skill mix project (from its aims through to the changes made and how the resultant mix was evaluated). The fact that the vast majority of publications on skill mix come from only one country - the United States - was also highlighted as a major constraint to the generalization of results.

This section uses the case studies to explore the reality of determining personnel mix in health care settings, in order to provide a better understanding of the factors that determine the approach taken.

Case studies were conducted in hospitals and primary care centres/clinics in Costa Rica, Finland, Mexico, the United Kingdom and the United States (hospitals only). These countries were selected for illustrative purposes, as having a range of different models of the provision of health care, in order to test the model that was developed. The aim of the case studies was to examine how health care managers decide on the mix of personnel to employ in a particular setting, and what data they use to inform these decisions. Two questions were addressed:

What are the 'presenting problems' for employing organizations? (i.e. why do health care providers embark on a 'skill mix exercise'?) What are the drivers?

How do they decide what to do? (i.e. what are the contextual factors that influence and constrain the choice of approach?).

2.1 Reasons for undertaking a skill-mix project

Before thinking about *how* skill mix decisions are made and the methodologies chosen, it is important to explore the possible reasons for planning to review the skill mix.

A number of basic principles seem to apply to every service provider. In a nutshell, the common aim is to provide health services in the most efficient and effective way possible. Since staffing costs usually account for 60-80% of operating costs, determining the 'right' combination of staff with the right skills is a critical component of successful and efficient health care delivery.

2.2 Drivers for skill mix

While issues of staff mix and skill mix are often characterized as being cost driven, there are other reasons why examining skill mix is of major importance in health care, particularly in terms of providing an organizational response to:

- skills shortages in particular professions or occupations; improving the management of individuals and organizations; sustaining quality improvements (or maintenance); securing improvements in unit labour costs (i.e. reducing costs per unit of "output", or improving "productivity");

- technological innovation;
- sector reform or changes in professional regulations/legislation;
- assisting in the development of explicit care standards or skills/competency-based training of staff (subsequently these may be developed as criteria for performance assessment).

These driving forces for focusing on skill mix are not mutually exclusive; in practice, many health care units are attempting to meet the combined challenges of more than one of these factors. It is also important to note that determining skill mix should not be just a “numbers game”. It should involve an assessment of the quality and competence of staff required. Professional associations and labour unions will often participate in this process. Organizations must also recognise that reviewing, and perhaps altering, skill mix may not be the only potential solution to meeting these challenges. Other options could include improving utilization/distribution of hospital beds, capital equipment and other resources; improving staffing patterns in relation to day-to-day fluctuations in workload and patient dependency; and reviewing and altering resource allocation and distribution within the health system (e.g. between tertiary, secondary and primary care (see, for example, Adams, 1994)).

The approach to skill mix is therefore necessarily different, depending on the individual context and the presenting problems. Case study sites were asked specifically about what had prompted them to consider changing or reviewing the mix of personnel. A list of drivers for skill-mix review is presented in Table 2.1.

Many of these drivers relate directly or indirectly to the macro-level shifts that can occur during health sector reform, or as a result of changes in health sector funding. Health sector reform often leads to a focus on value for money, quality, and outcomes, changing roles and service changes, which are all “drivers” highlighted above. The funding structure for health systems will also have an impact on drivers (WHO, 1999). Specific ‘presenting problems’ can differ hugely in different organizations and between countries. For example, a nationwide shortage of registered nurses acted as the prompt for one United Kingdom hospital to review its skill mix. It opted for a ‘group discussion approach’ that focused on thinking laterally about changing roles, and improving the efficiency of services without increasing the number of registered nurses. In contrast, in Finland, owing to unemployment amongst nurses and the surplus of highly qualified nursing staff some Finnish nurse managers were looking at ways of enriching the skill mix, rather than delegating duties to generic workers.

It should be remembered that while all of these drivers are valid prompts that may lead to a review of the personnel mix, the converse, that all these problems can be solved through skill-mix changes, is not always true. Each of these issues is affected by a wide range of factors, and the mix of personnel and skills is just one of them. For example, it would seem logical to think that an ideal skill mix would produce high quality patient care and thus, good patient outcomes. Thus, ideally, measures of the quality of care and impact on patient outcomes should be built into any evaluation of a particular mix. But against this, we need to keep in mind that the mix and skills of staff will not be the only factors that determine patient outcomes. As noted in the previous section, the quality of care provided, and the resultant patient outcomes, can depend on many factors.

Table 2.1 Drivers for skill-mix reviews

Presenting problem	Examples/descriptions
1. Staff shortages	Exploring new ways of meeting needs, for example: <ul style="list-style-type: none"> • reallocation of some/most activities to existing staff groups (substitution) • develop new roles
2. 'Inappropriate' use of skills	<ul style="list-style-type: none"> - Often cost-driven, feeling that 'valuable' skills are being wasted. Alternative staffing mixes are costed to show potential 'savings' achieved by delegation - Downward delegation/substitution - Multi-skilling
3. Value for money/cost containment	Often results in focus on 2 (above) and on efficiency/flexibility staffing relative to workloads
4. Quality/outcomes problem	<ul style="list-style-type: none"> - If issue is continuity of care, substitution may be the theme. - May also focus on patient processes or pathways
5. Understaffing	Often to prove the need to increase the staffing budget for certain areas/staff groups/grades
6. New approach/ideology	e.g. primary nursing, patient-focused care, necessitating a re-think on skill mix
7. Staffing inequities	Seek to address inequities in mix or 'fairness' of staffing across a unit
8. Changing case mix/patient dependencies	For example, increased dependency in both acute and community units when length of stay decreased
9. Establishing a new service	Often use existing service activity data matched to staffing data, to predict staffing needs
10. Changing roles	Could be external driver for role change, such as change in education and training or legislation (nurse prescribing, recognition of birth attendant role etc.)
11. Service changes	Externally driven change to level or type of service to be provided, for example: <ul style="list-style-type: none"> • de-institutionalisation of mental health services • balance between primary and secondary care
12. New processes/procedure	e.g. prompted by work on patient processes, care pathways etc.

Source: Case study material, Queen Margaret University College (QMUC) for WHO, 1999

Some of the drivers for skill mix changes are identifiable as being of local origin (e.g. a decision to introduce primary nursing), while others may relate much more to the wider context in which health services are being provided. For example, an inability to recruit staff into one type of post may be due to a national shortage. This may be due to a combination of conditions, such as insufficient workforce planning, resulting in too few staff being trained, or a reduction in the number of trained staff working in the health service due to competition from other sectors. The next section describes the importance of contextual factors in more detail, and how they may have a bearing on skill-mix changes and reviews.

2.3 Contextual factors

In addition to shaping the reasons for reviewing skill mix, the contextual factors also influence skill-mix reviews in another way. The presence of certain contextual characteristics defines the scope and extent of opportunity for change.

Underlying the efforts to determine the appropriate mix of health care personnel is the assumption that changes to the mix of skills or staff can be achieved. There is no point in undertaking a skill- mix review if it does not lead to a change in the configuration of skills and staffing. The basic premise indicated in the literature seems to be that everyone, regardless of setting or country, will want to know what mix of staff to employ/deploy, so that they can then change the mix to match the ‘scientifically’ determined ideal. This basic principle goes unchallenged within the literature and it tends to focus on the methodologies adopted to determine the ‘right mix’, or else to demonstrate the efficacy of a particular mix. But does this scenario always reflect the reality?

Skill mix may be a universal challenge. However, it is not a challenge that all managers or health professionals can meet. In some situations, the required resources are not available; in others, the context prevents possible solutions from being implemented. The case studies suggest that contextual factors have a significant effect, either directly or indirectly, on the ability of health service managers to change and review personnel mix. For example, in a country where staffing ratios are set nationally, or where staff are allocated to units (e.g. Mexico), a service manager at an individual institution may have comparatively little power to bring about a change in the skill mix of his or her unit. In other countries, such as the United States, the health system is highly deregulated — decisions can be made at a local level and there is a high degree of flexibility within the workforce.

Table 2.2 presents the contextual factors according to whether they have a direct/indirect effect on service providers, or are part of the wider context. The key issue about these contextual factors is the extent to which they are in the locus of control of health organization management nationally, regionally, or locally, within different countries.

Table 2.3 expresses each of the contextual factors as possible constraints on local flexibility. Scores were assigned (where 0 refers to no importance, and 3 is of major importance) to show the reported importance of each in the case study countries. This is for illustration purposes; further research could determine the appropriate “weighting” of different factors at different times, in different countries. The results reflect the relative rigidity/flexibility of health care systems in which local service providers operate; the lower the score, the greater the opportunity for local span of control and flexibility in skill-mix changes.

Table 2.2 Contextual factors

Direct/indirect factors	
D1.	Pay structures (national or local)
D2.	Existence of staffing norms/ratios (national, regional, or local)
D3.	Fixed allocation of staff/posts; public sector/civil service regulations
D4.	Legislation-led change of role
D5.	Profession-led change in role/entry requirements for profession
D6.	Regulation/credentialling of health professionals
D7.	Professional autonomy/supply of new staff from training (influence nationally, regionally, locally)
D8.	Accreditation of employer organizations
D9.	External budget setting
Context	
C1.	Funding (allocation to public and/or private sector health systems)
C2.	Public/private mix
C3.	Labour market factors (e.g. relative pay, demographics, recruitment problems, choice of alternative jobs; employment legislation, job protection)
C4.	General economic situation
C5.	Societal values of role of employment/jobs

Source: Case studies, QMUC for WHO, 1999

Table 2.3 Contextual constraints on skill-mix change in five countries

	USA	UK	Finland	Costa Rica	Mexico
Direct – Indirect					
1. National pay structure	NR	3	3	3	3
2. National/regional staffing norms/ratios	0	0	0	2	3
3. Fixed allocation of staff/posts; public sector/civil service regulations	NR	0	2	2	3
4. Legislative change of role	3	2	NR	2	2
5. Profession-led change in role/ entry requirements	2	2	3	1	1
6. Professional regulations/credentialling	2	2	1	1	1
7. Professional autonomy/control of supply of new staff from training	0	3	2	2	2
8. Accreditation of organizations	3	1	?	NR	NR
9. External budget setting	NR	3	3	3	3
Context					
1. Public-sector funding	NR	3	3	2	2
2. Public/private mix	NR	1	NR	2	3
3. Labour market factors	2.5	2	2	2	3
4. General economic situation	1	2	3	3	3
5. Societal values	0	0	2	3	3
Totals	13.5	24	24	28	32

Scores: 0 = of no importance; 3 = major importance

NR = not relevant

Context can play a critically important role in determining whether there is either the ability or desire to bring about changes to the mix of personnel and skills currently deployed within a health service. Understanding the context is therefore a crucial first step in determining whether skill mix change can be achieved, before deciding on how skills needs should be assessed.

Country context

For example, from the table above, Mexico and the United States are at different ends of a continuum in terms of the degree of the local span of control that exists, and thus, in the extent to which skill mix can be altered locally. This is one explanation why ideas and research on skill mix are most apparent in the United States, where the context provides the greatest opportunity to change mix — control over resourcing decisions is most devolved and decentralized, and there are few constraints on employment practice at the local level. In other countries, such as Mexico and Costa Rica, where there has been less decentralization of budgets and decision-making within the public sector health systems, and where there is more use of centrally-regionally determined norms, the pressure and scope for local skill mix activity is much less evident.

It would be easy to interpret these findings from a perspective that assumes that flexibility and freedom to make changes is 'good', and that rigidity and regulation is 'bad'. From a United States perspective, where much of the skill-mix literature originates, a lack of flexibility could be judged negatively. But such an interpretation is a value judgement. There is a tendency within the United States skill mix literature to assume that flexibility, in order to achieve the most cost-effective mix, is paramount. This reflects a culture with a tradition of free market enterprise, high job mobility and a private health system. This literature, therefore, often does not recognise the wider importance of employment within society, which would be highlighted in some other countries. It is written from a perspective where labour unions are often not a significant factor in health care labour markets. It is vital to keep this in mind when assessing lessons from skill-mix research.

Some countries with more 'rigid' systems may place greater value on employment stability in general, and job security of health service employees in particular. Finland, in recent years, experienced economic recession (like many other countries), which led to containment in health service expenditure. However, the response of the health service in Finland has been very different to that of the United States or the United Kingdom in relation to skill mix and cost control. The idea of de-skilling seems an anathema in Finland, where the importance and value of professional nursing is widely accepted. Thus, discussion around the proportion of non-registered support workers in the nursing workforce, that consumes so much interest in the United States, and growing interest in the United Kingdom, has not been evident to the same extent in Finland.

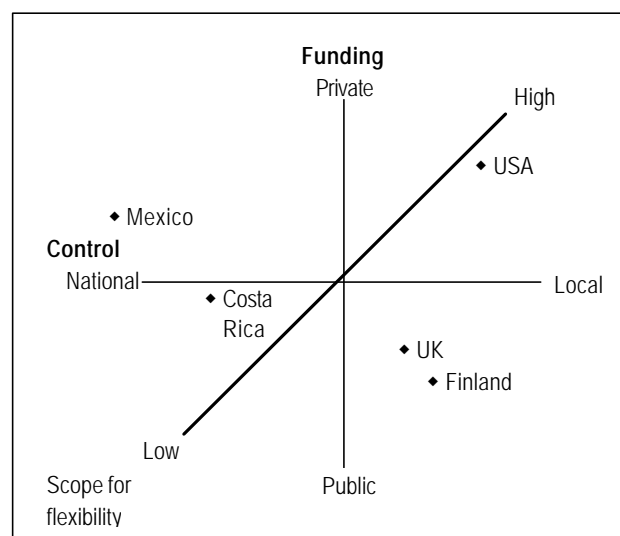
On the surface, the Finnish and United Kingdom health systems appear very similar – both have a state-funded system where decision-making is devolved to a local level, and both have some sort of purchaser/provider split. However, they have a very different approach to achieving the right mix of skills. The emphasis in the United Kingdom is on finding a methodology to predict the mix of posts required to deliver care within specific settings. For example, a review might be set up to establish how many of each type and grade of staff should be deployed to meet the service needs for the elderly in an acute hospital. Skills in this context are very much seen as posts or grades, and bringing about a change in skills is therefore about changing the mix of posts.

In Finland, in contrast, each post is numbered and the employer does not automatically have the power to change the mix of posts. Removing a post or changing it for another sort, has to be sanctioned by the district health board, comprising a locally elected group that is outside the service providers' management structure. Finnish society places a good deal of value on employment, and there is strong trade union presence. Instead of considering changing the mix of posts, there is much greater emphasis on the role of education and training in shaping and reshaping the skills of the workforce to meet service demands.

Span of control

The span of control for human resource management (national or local), and the extent of a public/private mix (see WHO, 1999:39) can be determinants of managerial flexibility in relation to skill mix. Figure 2.1 below highlights the variation between health systems in terms of where local human resources management (HRM) flexibility is greatest (the United States), and least prominent (Mexico and Costa Rica).

Figure 2.1 Funding mechanisms and span of HRM control



A further point to emphasize is that a country may 'shift' its position on the continuum of impact of contextual constraints. The introduction of autonomous management and

decentralized budgets in the United Kingdom's National Health Service in the 1990s "shifted" this country towards the right ("local") end of the span of control continuum, and therefore towards increased flexibility. Skill mix can therefore move up the agenda of local management when health sector reform is initiated.

In conclusion, the context is not only very important in influencing the *type* of skill-mix study undertaken and the methods used, it can also determine whether or not personnel mix is an issue at all for local service providers, in terms of their ability to influence or achieve change. In countries with limited local scope to alter skill mix, attention may thus focus on achieving change through other means: how staff are deployed (their roles, matching staffing to workload fluctuations, improving productivity etc.) rather than the mix of posts employed.

This section has highlighted the fundamental importance of context, in determining why and how skill mix can be an issue for health-care organizations. The next section of the report will examine the practicalities of achieving organizational change through examining skill mix.

3. Skill mix in practice

This section moves on from considering the theoretical and contextual aspects of skill mix, to practicalities. It provides guidelines for health professionals and managers who are considering a skill mix review.

There are four stages in the guidelines, each prompted by a question:

1. If skill mix is the answer, what is the problem?

There is a need to first define your current services and identify the problem(s) for which skill mix appears to be the solution. In practice, there may be other more appropriate methods of dealing with the problem(s). Stage 1, therefore, is about **evaluating the need for change**.

2. What is my span of control?

When weighing the options for selecting an approach to skill mix, or deciding that other methods are more appropriate, managers and health professionals need to assess the impact of contextual constraints on their capacity to act. Stage 2 is therefore about mapping the contextual constraints on autonomy and flexibility and **identifying the opportunities and barriers for change**.

3. What resources are available?

The implementation of a skill mix exercise will depend on the availability of organizational resources, in terms of knowledge of approaches, technical support, data availability, information systems, staff resources etc. There is no point in identifying an approach to skill mix which is resource intensive, if the resources are not available to support and sustain implementation. These resources will have to cover the direct and indirect aspects of skill-mix changes, including staff training and redeployment. Stage 3 is, therefore, about assessing resource availability and **planning for change**.

4. Which approaches to skill mix can be implemented?

Some approaches to skill mix can lead to immediate or short-term change. Others will require months or years to implement fully. The approach identified for implementation must have the potential to deliver change within the required time-scale. Stage 4 is, therefore, about identifying and implementing an appropriate approach to skill mix, and **making change happen**. This in turn leads back to stage 1, and to evaluating the impact of the new skill mix.

Figure 3.1 illustrates the four stages in the cycle. A skill-mix exercise should not be regarded as a “one-off” isolated event; there should be a regular process of evaluation to monitor impact. The four stages of the skill-mix cycle are discussed in greater detail below:

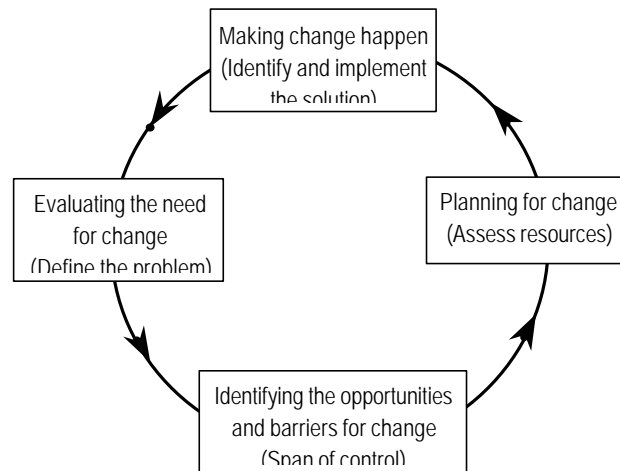


Figure 3.1 Funding mechanisms and span of HRM control

1. Evaluating the problem

First of all, the current services need to be assessed, in terms of activities, staffing configuration, etc. In order to be sure of the direction of change, the starting point must be clear. In addition, the effects of changing the skill mix need to be evaluated, and this requires baseline indicators. Some of the factors to consider are:

- Needs of patient/client groups;
- Current service provision-activity levels; bed occupancy, etc.;
- Staff involved: numbers, mix; deployment patterns; staffing indicators (turnover, absence, etc.);
- Activities performed/roles;
- Quality of care provided;
- Outcome indicators.

Secondly, the “problems” that may be solved by skill-mix changes need to be assessed. Can these problems be solved, and is skill mix the best solution?

Table 3.1 outlines the “presenting” problems which may trigger the need to evaluate skill mix. It also highlights the possible focus of skill-mix activity. A series of questions have to be answered, in deciding if skill mix is the answer to the problem(s):

- What is causing the problem? Are there underlying factors?
- What, if anything, is wrong with the current staff and skill mix?
- Have alternative solutions been considered, such as new working patterns, altering resource allocation, etc.?

Table 3.1 Types of problems and associated focus of skill-mix reviews

Presenting problem	Possible focus
1. Staff shortages	Roles Activities
2. 'Inappropriate' use of skills	Role overlap Activities
3. Value for money/cost containment	Depends on specific context
4. Quality/outcome problem	Depends on specific context
5. Understaffing	Workload measures
6. New approach/ideology	Roles Patient dependencies
7. Staffing inequities	Workload/activity Patient dependencies
8. Changing case mix/patient dependencies	Patient dependencies Patient classification
9. Establishing a new service	Ratios/norms
10. Changing roles	Activity analysis, role redesign
11. Service Changes	Depends on specific context
12. New processes/procedure	Roles

Source: Case study material, QMUC for WHO, 1999

2. Assessing span of control

An approach to skill mix may be the ideal solution, but it may not be achievable in practice, because of contextual constraints. The actual span of control must be assessed in order to identify the best achievable solutions. The checklist below highlights possible constraints, which are discussed in more detail.

Span of control checklist

- National pay structure
- Staffing norms/staffing ratios
- Employment regulation – civil service/public sector fixed allocation of jobs
- Regulation/credentialling of health workers
- Autonomy of education sector
- Accreditation of organizations
- External control of budgets
- Public/private mix of provision
- Labour market factors (relative pay, job protection etc)
- General economic situation
- Societal/cultural values

This checklist serves as a prompt for assessing the span of control, to map out the constraints on local autonomy to implementing changes in skill mix. Consider the following:

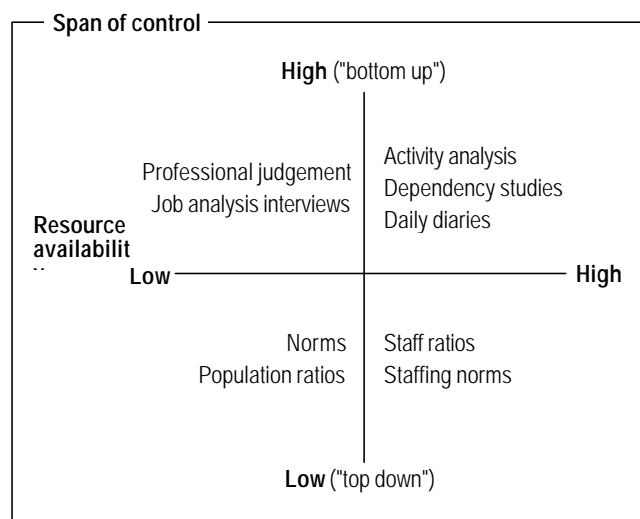
- What are the financial, resources, legislative and regulatory constraints arising from the context in which your organization is operating? How do these constraints limit your span of control in implementing skill mix changes and other staffing solutions?
- Which staff groups and work areas do you have responsibility for, and in which of these do you believe there is the potential to implement skill-mix changes and/or other solutions?
- What changes can you actually make, in practice:
 - Change mix of posts?
 - Change staff deployment across units/areas?
 - Change roles of current individual staff or staff groups?
 - Change mix by introducing new roles/staff groups?
- Where can you exert most influence? Where are the “levers” for change?

3. **What resources are available?**

Before choosing an approach to skill mix, you must assess the resources that you have available to support implementation and evaluation. Different approaches require different levels and types of resources, in terms of staff time, skills and training; information technology; data generation and analysis; technical support; and management resources.

Some approaches to skill mix are relatively resource intensive; others make little additional demands on resources. Some require short-term “up-front” resources while others have longer-term resource implications. Span of control, and resource availability will, in combination, play a major role in determining which approaches to skill mix are feasible (see figure 3.3 below).

Figure 3.2 Funding mechanisms and span of HRM control



- What costing and activity data is routinely collected, or available?

- What information technology and analytical skills can be made available?
- Can/should external consultants and technical support be made available?
- Can staff be trained and given the time off work to participate in working groups/data generation/data analysis?
- Can all the direct and indirect costs be met, including any retraining and redeployment?
- Is there a “business case” for doing the skill mix review – can the resource expenditure be justified?

4. Implementation

Selection and implementation of an approach to skill mix will be influenced by the time horizon for change, and the desired coverage of the exercise – Will it cover one unit, or a whole organization? Will it cover one staff group, or many? What is the likely level of consumer acceptance? What is the power relationships between different stakeholders in the proposed change?

Table 3.2 sets out the likely time-scale and requirements for eight main approaches to skill mix. In making decisions on which approach best matches requirements and available resources, it is important to reiterate that rarely is only one of the eight approaches selected and implemented in isolation.

Table 3.2 Resource/time-scale implications of methodologies

Approach	Resource implications	Data requirements	Likely time-scale of implementation
Task analysis	Data generation Training observers Analysis of data Staff working group	Significant, generated by the exercise	“One off” or regularly repeated. Mid-to long-term change
Activity analysis/activity sampling	Data generation Training observers Analysis of data Staff working group	Significant, generated by the exercise	“One off” or regularly repeated. Mid-to long-term change
“Daily diary”/self recording	Data generation Analysis of data Staff working group	Significant, generated by the exercise	“One off” or regularly repeated. Mid-to long-term change
Case mix/patient dependency	Data generation/data entry Analysis of data Information systems	Significant and continuous (I.T. required)	Regular process of adjustment
Zero-base reprofiling/re-engineering	“Diagnostic” data External consultants Staff working group	Significant in diagnostic phase	“One off” fundamental restructuring
Professional judgement	Limited	Limited	Continuous process of adjustment/refinement

Job analysis interviews/ role reviews	Trained interviewers	Generated by interviews	"One off" leading to short-to mid-term change
Group discussion/"brainstorming"	Staff time Skilled facilitation	Limited	"One off" occasional or regular, leading to short-to mid-term change

A skill mix review will usually make use of professional judgement and group discussions, supplemented, if desired, by one or more of the other approaches which have a higher level of resource implications. Whichever approach(es) are chosen, the following checklist will assist in implementation:

- Staff ownership
- Defined boundaries
- Action plan
- Communication strategy
- Information requirements
- Analysis of information
- Implementing the new skill mix
- Evaluating implementation

Staff ownership. Have you ensured that staff are involved in the process of change? Do they know the reasons for undertaking the skill-mix exercise?

Defined boundaries. Have you delineated clearly the "boundaries" of the skill-mix exercise, in terms of work areas, units and staff groups? Boundaries should be determined primarily by the services provided.

Action plan. Have you an agreed action plan, which sets out objectives, responsibilities, timing, and key "milestones"

Communications strategy. Have you devised a strategy for communicating with users of the service and staff, to explain the implications of the skill-mix review and related changes?

Information requirements. Which of the following types of information do you have/need?

- Needs of client groups/users
- Current activity levels (bed occupancy, number of treatments, etc.)
- Patient dependencies/workload assessments
- Staffing numbers, deployment, costs
- Staffing activities, roles
- Quality of care indicators
- Outcome measures

Analysis of Information. How will information be analysed and interpreted, and by whom? How will you ensure that professional judgement and staff "ownership" is supported in this process?

Implementing the new skill mix. How will you support implementation of the new mix? Have you taken account of shift patterns and rostering, time off for training,

sickness absence levels etc.? Will “natural wastage” be used to determine the time-scale for change in skill mix, or will you plan to redeploy or retrain any displaced staff?

Evaluating implementation. What quality, cost and outcome indicators will you use to monitor and evaluate implementation? What is the appropriate time-scale for evaluation, and what plans do you have for regular reviews? The skill-mix cycle is closed, by evaluating the impact of change, and deciding if further change is then required.

4. Conclusion

The aim of this section of the report has been to provide practical guidelines for managers and health professionals who are intending to use skill mix as a potential solution to service problems. The guidelines have emphasized the need to evaluate the problem, and examine the context, before deciding if skill mix is the answer. It is also important to note that the guidelines are provided bearing in mind that organizations rarely examine skill mix in a “pure” theoretical sense. They have to adopt a pragmatic approach, which takes account of the day-to-day realities of their priorities and resources.

Changing skill mix is not a panacea for all the ills of an organization. It has a role to play in improving organizational effectiveness and quality of care, but it must be recognised for what it is - a process for achieving change. An organization should not embark lightly on making changes in skill mix. It must consider all four phases of the skill mix cycle:

- Evaluating the need for change
- Identifying the opportunities for, and barriers to, change
- Planning for change
- Making change happen.

Skill mix is not just a technical exercise. It is a method of organizational change which requires careful planning, communication, implementation and evaluation if it is to achieve its objectives.

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Annex

Typology of approaches to skill mix

1. Task analysis

- (i) Jobs within the area under review are broken down into individual tasks, and each task is assessed in terms of by whom, when, how often, and for how long they are undertaken.
- (ii) A staff cost per minute of each grade/occupation of staff time is derived from wage costs.
- (iii) A cost per task is derived, using the appropriate staff cost, task time and frequency.
- (iv) Using the data and analysis for (i) to (iii), a working group composed of relevant staff and management define the skills and knowledge required for each defined task.
- (v) The working group also agrees the correct staff “profile”, in terms of current skills and knowledge possessed by each grade/occupation.
- (vi) The working group then identifies “gaps” and mismatches between the current allocation of tasks to skills/knowledge.
- (vii) This allows identification of the ‘ideal’ task allocation — that which would maximize efficiency and effectiveness by ensuring that tasks are allocated to the “least expensive” appropriately skilled staff — and also the identification of training needs for staff.

This method is usually most appropriate if activities and tasks are easily definable and “measurable”. Reliance on trained observers contributes significantly to the cost of this approach; it can also be problematic if there is no agreement on the skills/knowledge required for specific tasks. The task-based approach has also been criticized by some commentators because in disaggregating jobs and roles into “measurable” tasks, it may fail to capture much of what “holistic” caring roles encompass.

2. Activity analysis/activity sampling

- (i) The activity being performed by each staff grade/occupation is recorded at predetermined specific intervals (eg. every five minutes, or fifteen minutes) by trained observers on a form, template or hand-held computer, using a pre-agreed comprehensive list of possible activities.
- (ii) This activity data is collected for all involved staff for an agreed time period - usually between one week and one month (care must be taken to control for the representativeness of the particular time period).

- (iii) The data is normally inputted and analysed on computer, enabling the frequencies of different activities and time required for each to be assessed, and the mix of staff grade/occupations undertaking each activity to be profiled.
- (iv) Analysis of the activity data and staffing profile enables decisions on reallocation of activities to different staff grades/occupations to be undertaken from an informed standpoint.

The main benefit of this approach is that the quantitative data can be used to inform judgements and it allows discussion and debate using commonly agreed measures. The limitations relate to the use of observers (who are comparatively expensive, and may not fully understand or record what they are observing); the difficulties of using this approach in any work environment other than a “fixed” ward or unit (i.e. it is difficult to use in community/primary health settings); and the danger that a lack of staff involvement in the approach may limit its acceptability.

One example of activity sampling (also known as work sampling) is the analysis of primary care services in Jamaica (Desai and McCaw, 1987). In this study, trained observers assessed the activities undertaken by 504 primary care staff, using a precoded list of different activities. The study found that public health nurses were the group spending the highest proportion of time “productively”, in comparison to other categories of worker.

Similar methods were used in a study of primary care staff in Zimbabwe (Woelk et al, 1986). Using activity sampling, the study recommended increasing the delegation of duties to medical assistants to free up nurses to undertake more supervisory work. (See also Bryant and Essomba, 1995).

3. “Daily diary”/self-recording of activities

This approach uses the same methods as activity analysis, by recording activity over an agreed time period on a predetermined checklist. It differs in that the staff members themselves, rather than external observers, undertake the recording and complete the forms.

The approach may limit the problems of cost and comprehension created by using external observers, and give staff “ownership” of the data and the method. However, the main limitations are that individual staff may not provide accurate details (this can be mitigated by quality assurance sampling and by using a pilot exercise) and there is an opportunity cost of time spent by staff during the exercise.

One example of the use of self-recorded data is in relation to the redesign of skill mix in the intensive care unit of a United States hospital (Pedersen et al, 1995). The study analysed the time spent by registered nurses on “non-nursing” duties in order to identify the potential for introducing care assistants.

4. Case mix/patient dependency

- (i) This approach relies on the assumption that certain types of patients, for example those with the same diagnosis, will have similar needs, and therefore the care of patients in the same grouping will require similar levels and types of care. Thus a patient classification system is used as an indicator of staffing requirements. The focus is generally on determining the required numbers of nursing staff.
- (ii) There are two main ways of classifying patients. One is to use a clinical diagnosis as the basis of classification (e.g. Diagnostic Related Groups (DRGs)). Benefits of using clinical diagnosis are that it has common currency with health care staff, it can be relatively clearcut, and can be extracted from existing records or case notes without having to make a new assessment of the patient. A disadvantage is that the care requirements of patients categorized in the same DRG can vary widely.

The alternative approach is to group patients according to their level of dependency on e.g. nursing care. Typically, patients are classified on a numerical scale (e.g. 1 to 5) by either the nurse in charge or by the nurses having the most contact with each patient. The patient classification relates directly to the staffing input that is likely to be required. At the heart of this system is a formula relating patient scores to minutes of e.g. nursing care required. The accuracy and usefulness of a patient dependency scoring system depends on how the link between patient scores and the staff required is made. Ideally, the equation relating patient scores to the nursing staff required should be based on locally-derived activity data. The less locally-specific the timings, the greater the scope for inaccuracy.

- (iii) Patient dependency scoring systems use a combination of qualitative and quantitative techniques. The classification of patients into groups relies on a professional judgement, but translating the scores into staffing figures requires data derived from activity analysis.
- (iv) Most of the systems that rely on patient classification are used to determine overall numbers of nursing staff rather than the specific *mix*. Some use nurses' opinions of the roles to calculate the proportion of each grade of staff required.
- (v) Patient classification systems (PCS) are particularly useful for determining how the staffing profile may need to be changed over time — either to identify peaks and troughs of staffing needs over the course of a typical week, or seasonal changes in case mix and dependency of patients. They can be used to adjust staffing accordingly.

There is an extensive body of literature on the use of patient acuity, patient assessment and workload assessment approaches to determining staffing requirements. Most published studies relate to hospital-based nursing care, and are from the United States (see e.g. De Groot, 1994; Detwiler and Clark, 1995) with a few studies from other countries (e.g. CarrHill et al, 1995; Pratt et al 1993). However, very few studies then go on to translate “requirements” into staffing numbers and mix. To do so requires some parallel assessment of workload/ activity levels.

Different “off-the-shelf” patient dependency and workload assessment systems are available. Research has shown that each system will give a different “answer” when applied to the same organizational context (Cockerill et al, 1993; Carr-Hill and Jenkins-Clarke, 1995). This reinforces the point that there is no universal truth in determining staffing and skill mix. It also highlights the need to maintain an element of expert professional judgement when interpreting the results of the application of a particular method or system.

5. Reprofiting/“re-engineering”

- (i) As a starting point, a detailed analysis or diagnosis of current staffing mix, activity, skills and costs is undertaken, for consideration by a working group.
- (ii) The working group also reaches agreement on the purposes and strategic plan for the particular unit.
- (iii) Alternatives to the current personnel mix are then considered. This approach may assume a “zero base” or a ‘blank sheet of paper’, on which the working group constructs what it regards as the “ideal” personnel mix to provide the agreed activities and skills required to meet the purposes of the unit, within the identified costs.
- (iv) This ‘ideal’ should be subjected to comprehensive testing of assumptions, using an iterative approach. In essence, it is attempting to answer the question “Setting aside correct staffing configuration and constraints, what would be the ideal mix of staff to meet the purposes of the agreed service and strategic plan?”

This radical approach to reviewing personnel mix represents a fundamental restructuring of an organization, and in practice is rarely attempted, because of organizational constraints and considerations. Another version of it is sometimes evident when an organization is “re-engineered” by a fundamental restructuring of work processes and by the introduction of multiskilled and cross-trained staff. A variation on the zero budget approach to the justification of resource allocation, the main strength of this approach is its requirement to think “alternatively” and to address the fundamental question of concerning the purposes and strategic objectives of the organization. The major limitation of the approach is that, even if it secures the support of staff, it can become a ‘wish list’, an ideal of “where we want to be”, rather than a method of “how we get there”.

6. Professional judgement

- (i) Staff/managers familiar with the work area to be reviewed form a working group to discuss/assess work.
- (ii) The group reviews available information on activities/skills, and uses the professional judgement and knowledge of the work area to agree any reallocation or reconfiguration of work which will improve effectiveness.

This approach can be comparatively quick to undertake, has the benefit of involving staff from the beginning and has limited resource implications. However its major constraints are that, if used in isolation, it can have a lack of transparency and objectivity; and there is a likelihood that any outcome, in terms of proposed changes, may be marginal.

In practice nearly all approaches to determining skill mix require an input of professional judgement. The determining factor is whether professional judgement is the basis of decision making, without other methods being applied, or is used as a moderating or verification intervention for other (often “quantitative”) approaches (see e.g. Wheeler and Ngcongco, 1990).

7. Job analysis interviews/ role reviews

- (i) The use of detailed interviews with individual job holders or small groups of staff can be undertaken to assess skills and activities, or job roles
- (ii) Job analysis is usually undertaken using a structured interview approach, to elicit details of job content and how different tasks and activities fit together. The approach can incorporate elements of the “critical incident technique” (e.g. Cheek et al, 1997), which attempts to differentiate between tasks and activities that are central to excellent performance in a job, and those that are not, by requiring the job holder to describe several examples of ‘excellent’ and ‘poor’ performance in their job. Another technique which can be applied is that of “repertory grid” (see Stewart and Stewart, 1981), which requires job holders to compare activities and tasks, in terms of their components, the skills required to perform them well, and the cognitive processes which underpin them. Repertory grid can also be used by job holders to rank, in order of difficulty and frequency, different tasks and required skills.
- (iii) Interviews of individual job holders and managers is likely to comprise one element of any approach to determining personnel mix: they may be used to supplement data derived from the quantitative approaches, but alternatively may comprise the main source of descriptive information or activities and skills required as a basis for making decisions.

The main benefit of using job analysis interviews is that a structured approach, conducted by skilled interviewers, can generate much relevant information on job content and skills. Staff are also involved in the process from the outset. The limitations of the approach, if used in isolation, are its restricted objectivity and potential for interviewer bias.

8. Group discussion/"brainstorming" session

- (i) A facilitated workshop of staff is organized, to discuss such topics as activity lists, job roles and overlap, job dissatisfaction, organizational "blockages" on staff performance and scope for "doing things differently".
- (ii) The results of the workshop, in terms of lists of activities, opinions on current problems and suggestions for change, can assist in determining the scope for altering practice in relation to staff mix and deployment.

This approach is comparatively quick, requires skilled facilitation, and can lead to an 'honest' debate about working practices, but is likely to generate a mass of opinions (some contradictory), many of which will be unsettling and will create expectations of positive change amongst staff. As such, it may be conducted as the initial "diagnostic" phase of a review, rather than serving as the main source of data and information.

Group discussion can give staff "ownership" of the results of a quantitative approach. One example is the application of the Indicator of Staffing Needs (ISN) system in Papua New Guinea (Kohlemainen-Aitken and Shipp, 1990), and in Botswana (Wheeler and Ngcongco, 1990). This approach uses a workload assessment/staffing formula, but the weightings for different elements of the formula are determined by a working group, applying expert judgement to the specific organizational context.