Thought and action

Mobach, M.P.

Appendix 1 Sample and Population

Introduction

The *profile* results of the response are presented in **table a1.1.- a1.17.** below. In **table a1.1.-a1.5.** data from the Dutch population of community pharmacists were used. The issues presented within this section were sex, age, location, (in)dependence and so-called 'formulas' (in which pharmacists are cooperating with respect to various issues). In **table a1.6.-a1.17.** data from a large sample (N=700) were used.[43] The issues presented within this section were FTE (Full-Time Equivalence) assistants and other personnel, FTE pharmacists, total WTG (Wet Tarieven Geneesmiddelen) and non-WTG prescriptions, total patient population and total turnover. The hypergeometric distribution was applied for **table a1.1-a1.10** and is illustrated in **appendix 2**. For some results no population data were available (**table a1.11.-a1.17.**). The issues presented within this section were seniority, cooperation, total personnel in part-time, total personnel in full-time, net profit, time for direct tasks and time for *in*direct tasks.

Data from the population (N=1521);

The sample of pharmacy managers consisted of 73% (compare **table a1.1.** for exact score: 73.3%) (rounded up population frequency [KNMP]: 65%) males and 27% (35%) females.

source	**random sample**		**KNMP[44]**
			N=1521
sex	**n=146**	**%**	**%**
male	107	73.3%	65.4%
female	38	26.7%	34.6%

Table a1.1. Sex.

[43] Although these data did not represent the whole population, it was assumed that the frequencies of these sample features were similar to the population.

[44] From the data of the Royal Dutch Association for the Advancement of Pharmacy (KNMP) of July 1996.

The age group of 35 to 50 years was most frequently observed: 62% (52%). In addition, 25% (31%) was aged younger than 35, 13% (16%) was aged from 50 up to and including 65 years old and 0% (1%) was older than 65.

source	**random sample**		**KNMP N=1521**[45]
age	**n=145**	**%**	**%**
< 35 years	36	24.8%	31.3%
35-50 years	90	62.1%	52.1%
50-65 years	19	13.1%	15.5%
> 65 years			1.1%

Table a1.2. Age.

The location of 62% (57%) of the pharmacies was in the suburban area of a city and in the city centre. 38% (43%) of the pharmacies were located in rural areas and other.

source	**random sample**		**KNMP N=1521**[45]
location[46]	**n=140**	**%**	**%**
city	87	62.1%	56.5%
rural area/other	53	37.9%	43.4%

Table a1.3. Location.

[45] From the data of the Royal Dutch Association for the Advancement of Pharmacy (KNMP) of July 1996.

[46] Within the questionnaire a distinction between city centre, suburb and rural area was made. The distinction within the population data was city and rural area/commuting area. KNMP data from July 1996 showed that 56,5% of the pharmacies were in a city, and 43,4% of the pharmacies were in a rural area/commuting area. It was assumed that city centre/suburb in the questionnaire corresponded with city in the population data, and that rural area corresponded with rural area/commuting area.

Within the random sample 72% (69%) of the pharmacy organizations were managed by an independent pharmacy manager. The pharmacy managers in employment were 26% (27%), in addition, 2% (4%) of pharmacy managers in employment were working towards being independent.

source	**random sample**		**KNMP/VNA N=1521**[47]
employment	**n=145**	**%**	**%**
independent entrepreneur	104	71.7%	68.9%
in employment	38	26.2%	27%
in employment and working towards being independent	3	2.1%	4.1%

Table a1.4. (In)dependence.

[47] KNMP data relating to independent entrepreneurship, and data of the stichting VNA relating to pharmacy managers in employment and working towards being independent were used. The KNMP data from July 1996 showed that 60% of all pharmacy managers are pharmacy owners and 68.9% established owners. Within this study it was assumed that an independent pharmacy manager was an established owner. The data of the stichting VNA from September 1996 show that 63 pharmacists were 'in employment and working towards being independent'. The percentage was calculated by dividing this number of pharmacy managers by the total number of pharmacies in accordance with the KNMP data from May 1996 (1521). The percentage of the category 'in employment' was calculated as a 'remaining'percentage. The percentages from the other categories were subtracted from 100%.

The pharmacies not participating in a pharmacy concept were 83% (81%). In addition, 17% (19%) was related to so-called 'formulas' like Kringapotheek, Meditheek, Extra Apotheek, Baliemodelapotheek or the Service Apotheek. In formulas pharmacies pay membership and cooperate with respect to information policy, interior design, education, customer studies et cetera.

source	**random sample**		**formula-organizations[48] N=283**
pharmacy formula	**n=142**	**%**	**%**
formula	24	16.9%	18.5%
no formula yet	118	83.1%	81.4%

Table a1.5. Formulas.

[48] The information used for the data was provided by the so-called 'formula' organizations. A total number of 238 pharmacies were connected with a formula in September 1996. Per formula the numbers are Kringapotheek (66), Meditheek (76), Extra Apotheek (60), Baliemodel Apotheek (6), and Service Apotheek (75), figures all from September 1996. The category *no formula (yet)* was calculated by subtracting the number of formula pharmacies from the total number of pharmacies in accordance with the KNMP data from May 1996 (1521). The pharmacy formulas observed in the sample were Kringapotheek (7), Meditheek (3), Extra Apotheek (5), Baliemodel Apotheek (1), and Service Apotheek (8).

Data from a large sample (n=700);
The FTE comprised pharmacists and other personnel. The completement in Full-Time Equivalence (FTE) for other personnel consisted of 4 to 7 FTE for 42% (50%) of the pharmacies. In addition, 25% (14%) used less than 4 FTE for other personnel, 23% (23%) used 7 to 9 FTE and 10% (13%) used 9 FTE or more.

source	**random sample**		**SFK[49] N=700**
assistants and other	**n=140**	**%**	**%**
<4 FTE	35	25.0%	14.2%
4 to 7 FTE	59	42.1%	50.1%
7 to 9 FTE	32	22.9%	23.2%
≥ 9 FTE	14	10.0%	12.6%

Table a1.6. FTE assistants and other.

The FTE for pharmacists consisted of less than 1.5 FTE for 74% (66%) of the pharmacies. In addition, 26% (33%) used 1.5 to 3 FTE for pharmacists, 0% (0.7%) used 3 to 4,5 FTE and 0% (0%) used 4,5 FTE or more.

source	**random sample**		**SFK[49] N=700**
pharmacists	**n=142**	**%**	**%**
≤ 1.5 FTE	105	73.9%	66.2%
1.5 to 3 FTE	37	26.1%	33.1%
3 to 4.5 FTE			0.7%
≥ 4.5 FTE			0%

Table a1.7. FTE pharmacists.

[49] From the data of the Stichting Farmaceutische Kengetallen (SFK) of July 1996 of all 700 participants of the SFK.

The total number of prescriptions (including non-Wet Tarieven Geneesmiddelen [WTG]) consisted of 50,000 to 70,000 prescriptions for 36% (32%) of the pharmacies in 1994. In addition, 25% (17%) of the pharmacies processed less than 50,000 prescriptions, 21% (28%) processed 70,000 up to and including 90,000 prescriptions and 18% (23%) processed more than 90,000 prescriptions.

source	**random sample**		**SFK[50] N=700**
prescriptions	**n=131**	**%**	**%**
< **50,000**	33	25.2%	16.7%
50-70,000	47	35.9%	32.4%
70-90,000	27	20.6%	27.6%
> **90,000**	24	18.3%	23.3%

Table a1.8. Total WTG and non-WTG prescriptions 1994.

The total number of patients consisted of 8,000 to 11,000 patients for 39% (36%) of the pharmacies in 1996. In addition, 33% (29%) of the pharmacies served less than 8,000 patients, 22% (21%) served 11,000 up to and including 14,000 patients, and 6% (13%) served less than 14,000 patients.

source	**random sample**		**SFK[50] N=700**
patients	**n=141**	**%**	**%**
< **8,000**	46	32.6%	29.5%
8-11,000	55	39.0%	35.9%
11-14,000	31	22.0%	21.5%
> **14,000**	9	6.4%	13.1%

Table a1.9. Total patient population 1996.

[50] From the data of the Stichting Farmaceutische Kengetallen (SFK) of July 1996 of all 700 participants of the SFK.

The total turnover consisted of 2.5 to 3.5 million Dutch guilders for 34% (34%) of the pharmacies in 1994. In addition, 29% (16%) of the pharmacies had a turnover of less than 2.5 million, 23% (27%) had a turnover of 3.5 up to and including 4.5 million, and 14% (23%) had a turnover of more than 4.5 million.

source	**random sample**		**SFK[51] N=700**
total turnover	**n=128**	**%**	**%**
< Dfl. 2,500,000	37	28.9%	15.8%
Dfl 2,5-3,500,000	43	33.6%	34.2%
Dfl 3,5-4,500,000	30	23.4%	27.1%
> 4,500,000	18	14.1%	22.9%

Table a1.10. Total turnover 1994.

No usable data from the population available;
Seniority was for 39% of the pharmacy managers 6 up to and including 15 years. In addition, 10% had a seniority of less than 2 years, 21% had a seniority of 2 to 6 years and 30% longer than 15 years.

source	**random sample**	
seniority	**n=145**	**%**
< 2 years	15	10.3%
2-6 years	30	20.7%
6-15 years	56	38.6%
> 15 years	44	30.3%

Table a1.11. Seniority.

[51] From the data of the Stichting Farmaceutische Kengetallen (SFK) of July 1996 of all 700 participants of the SFK.

A total of 60% of the pharmacies were independent. Of the remaining pharmacies, 4% cooperated with a health-care centre, 1% with a chain of pharmacies[52], 16% had ownership of several pharmacies, 17% participated in a cooperation of some kind and 2,1% participated in a so-called 'transfer formula'.[53]

source / **organizational form**	**random sample**	
	n=141	**%**
independent pharmacy	84	59.6%
health-care centre	6	4.3%
chain pharmacy	2	1.4%
management of several pharmacies	22	15.6%
part of a cooperation	24	17.0%
transfer formula	3	2.1%

Table a1.12. Cooperation.

[52] A pharmacy chain is an intensive cooperation between pharmacies. Pharmacy managers are employed by the chain. An example is the Boots chain which recently started in the Netherlands.

[53] A transfer formula is a financial construction within which pharmacy managers become independent in stages. An example is the construction of stichting VNA in the Netherlands.

Personnel consisted of part-time and full-time staff. Full-time staff were employed for 38 hours per week or more, part-time staff for less than 38 hours. In the sample, 43% of the pharmacies employed 5 to 10 part-time members of staff. In addition, 8% employed 2 or fewer part-time members of staff, 39% employed 3 to 5 members of staff and 10% employed 10 or more members of staff.

source	**random sample**	
part-time staff	**n=145**	**%**
≤2	12	8.3%
3 to 5	57	39.3%
5 to 10	62	42.8%
≥ 10	14	9.7%

Table a1.13. Total part-time staff.

In the sample, 50% of the pharmacies employed 3 to 5 full-time members of staff. In addition, 22% employed 2 or fewer part-time members of staff, 27% employed 5 to 10 members of staff and 1% employed 10 or more members of staff.

source	**random sample**	
full-time staff	**n=145**	**%**
≤2	32	22.1%
3 to 5	72	49.7%
5 to 10	39	26.9%
≥ 10	2	1.4%

Table a1.14. Total full-time staff.

The net profit (after purchase and costs and before taxes) consisted of 100,000 to 250,000 Dutch guilders for 42% of the pharmacies in 1994. In addition, for 21% of the pharmacies the net profit was less than 100,000, 23% had a net profit of 250,000 up to and including 400,000, and 14% a net profit of more than 400,000.

source	**random sample**	
net profit	**n=117**	**%**
< Dfl. 100,000	25	21.4%
Dfl 100-250,000	49	41.9%
Dfl 250-400,000	27	23.1%
> 400,000	16	13.7%

Table a1.15. Net profit 1994.

The time for direct pharmacy tasks (for example, pharmaceutical tasks, managerial tasks, Pharmaco-Therapeutic Consultation (FTO) and checking of prescriptions) was more than 40 hours per week for 62% of the pharmacies. A total of 1% of the pharmacists spend fewer than 20 hours for these tasks, 8% spend 20 to 30 hours and 29% spend 30 to 40 hours.

source	**random sample**	
hours per week	**n=146**	**%**
< 20 hours	1	0.7%
20-30 hours	12	8.2%
30-40 hours	42	28.8%
> 40 hours	91	62.3%

Table a1.16. Time for direct tasks per week.

The time for *in*direct pharmacy tasks, for example, (committee) tasks related to the pharmaceutical profession in general, conferences and courses, was less than 10 hours per week for 70% of the pharmacists. A total of 20% of the pharmacists performed indirect tasks from 10 to 15 hours per week, 6% from 15 to 20 hours, and 4% more than 20 hours.

source / **hours per week**	**random sample**	
	n=146	**%**
< 10 hours	102	69.9%
10-15 hours	29	19.9%
15-20 hours	9	6.2%
> 20 hours	6	4.1%

Table a1.17. Time for *in*direct tasks per week.

Conclusion

The results of the sample and the data from the population were presented in **table a1.1.-a1.17.** Roughly, the correspondence seems reasonable. However, in some tables differences between sample and population were observed. Were these differences alarming? To give a more exact answer to possible non-correspondence between sample and population, a statistical comparison was made using the hypergeometric distribution in **appendix 2**. As well as thus an additional MANOVA was made, if non-correspondence was observed for a certain variable, for example, too many female pharmacy managers. In the MANOVA we checked if the scores of this variable for *thought* and *action* varied from other variables. In other words: did female pharmacy managers have other scores than male pharmacy managers?

Appendix 2 Generalization

Introduction

The results of the sample and the data from the population were presented before, in **appendix 1**. Roughly, the correspondence seemed reasonable. However, in some tables differences between sample and population were observed. Were these differences alarming? Did generalization seem reasonable? To give a more exact answer to possible non-correspondence between sample and population, a statistical comparison was made using the hypergeometric distribution, in **appendix 2** here.

Methods

Harnett and Murphy (1986: 205, 226-229) note that the binomial distribution has a widespread application in problems concerned with sampling. In such applications, use of the binomial distribution usually requires the assumption that one is sampling with replacement, because the probability of a 'success' on one trial (π) must remain constant from trial to trial. However, many practical sampling problems involve sampling *without replacement*. Fortunately, if the number of trials (n) is not too large in relation to the population size, the binomial can still be used because it provides a good approximation to the correct answer. However, in cases where sampling is without replacement and the sample size exceeds 5% of the population size, this approximation is not sufficiently accurate, and it is necessary to use the hypergeometric distribution to determine correct probability. The hypergeometric distribution applies to problems in which there are two or more different kinds of elements in a *finite population*. For this study, the hypergeometric distribution seemed to be a good distribution with respect to sampling. The random sample of this study was made *without replacement* in a population of 1521 pharmacies with a response of 9% (*more than 5%*) of the population. Molenaar (1971) defines an accurate approximation for the hypergeometric parameter r with one-sided confidence coefficient 1-α, when c red balls have been observed in a sample of size n ≤ ½N, drawn without replacement from N balls out of which r are red. The approximation is based on binomial bounds which are refined for a sample without replacement from a finite population. The applied formulas are:

$\lfloor r \approx ½(c-1) + ½(2N-n+1)\lfloor p;$	for the lower bound to the number of successes
$\lceil r \approx ½c + ½(2N-n+1)\lceil p;$	for the upper bound to the number of successes

where $\lfloor r$ and $\lceil r$ are the hypergeometric confidence bounds, c is the number of observed cases per cluster in the sample, N is the size of the population of Dutch pharmacies, n is the size of the random sample and $\lfloor p$ and $\lceil p$ are the calculated binomial confidence bounds based on c/n, N and a lower bound (.025) and upper bound (.975). The hypergeometric confidence bounds of Molenaar were used to compare the sample characteristics with the population characteristics. Sample results are frequently used to make an estimation of the population, especially if no detailed

data from the population are available. For example, if we use a confidence interval of 95% and 39 female pharmacy managers were observed in the sample (146), it can be estimated that in the population (1521) the number of female pharmacy managers will be between 278 and 505. Within this study, some detailed information about the population was available. The sample results were used to calculate confidence bounds and, in addition, were compared with the available population results. In the example, the number of female pharmacy managers in the population (for example, 385) should be within the confidence interval: between the lower and upper bounds of 278 and 505. Consequently, if the population results were within the confidence interval, we assumed that the sample was a good representation of the population. A similar procedure was made for the non-response group.

However, if the number of female pharmacy managers in the population (for example, 526) was not between the calculated lower and upper bounds of 278 and 505; it was assumed that the sample was not a good representation of the population. Consequently, it was analyzed what the effects of an over-representation of under-representation were: 'Did female pharmacy managers have other scores than male pharmacy managers with respect to *thought* and *action*?'. Differences in the results of *thought* and *action* were tested. For example, the results of female and male pharmacy managers were compared. A frequently applied method to test means of different groups is MANOVA. Norusis (1992: 84) notes that two concerns dictate the choice of the multivariate criterion: power and robustness. That is, the test statistic should detect differences when they exist and not be much affected by departures from the assumptions. The most powerful and robust criterion is Pillai's. Pillai's trace was applied here. Lewis-Beck (1993: 337-369) considers that MANOVA evaluates mean differences on two or more dependent criterion variables simultaneously. MANOVA is usually conducted as a two-step process. The first step is to test the overall hypothesis of no difference in the means for the different groups. If this test is significant, the second step is to conduct follow-up tests to explain group differences. A common use of MANOVA is a first presentation of the multivariate tests, followed by a presentation of univariate tests. Stevens (1996: 161-163) notes that the multivariate tests show an overall level of significance, and the univariate tests show the contribution of the variables to the overall multivariate significance. Both tests were applied here.

The MANOVA was made for all questions with a level of significance of α=.05. The factors used were the questions (female/male etc.) and the dependent variables were the pharmacy-mix scores for *thought* and *action*. A multivariate test was made for two scores of *thought* and all mix scores of *action*. The scores applied for *thought* were limited because the information of three scores could not be applied in MANOVA: the additions of outcome of all cases for *thought* were equal. The scores

for *thought* were dependent in such a way that if two scores were known (for example 1 and 2), the third score was evident (3). It was decided to use two scores for the multivariate tests. For the univariate tests, all scores of *thought* and *action* were used.

Stevens (1996: 6-9) also notes if *k* hypotheses are tested each with an α of say .05, that we capitalize on change, and advises us to use α/k as an 'overall α' instead of α in these situations. The 'overall α' of this so-called Bonferroni Inequality was applied here for the significant results of MANOVA.

Results

The (derived) data from the population were available for a total of 10 out of 17 main questions for profile. A hypergeometric distribution was used for all 33 subquestions for which the population data (N=1521) or the data from a large sample of the SFK (N=700) were available. A total of 18 out of 33 subquestions of the sample was observed within the confidence interval, and consequently 15 subquestions were not within the confidence interval. It was assumed that the 18 subquestions within the interval were corresponding within the population. However, 15 subquestions were not corresponding with the population. We cannot hence say much about the representativeness for the analyzed variables; the number of corresponding and non-corresponding variables was very similar. What was the effect of the non-correspondence with respect to the scores? A MANOVA was used to check if patterns could be found in the scores of *thought* and *action*. For example, did the scores of over-represented female pharmacy managers differ from scores of male pharmacy managers?

category	**absolute numbers (N)**	**confidence bounds (n)**
male	995	1004-1213
female	526	278-505
age 35-50	792	824-1054
age 50-65	235	508-738
age >65	167	ø (0)
< 4 FTE assist. and other	215	276-483
4-7 FTE assist. and other	762	526-755
≤ 1.5 FTE pharmacists	1006	1012-1227
3-4.5 FTE pharmacists	10	ø (0)
< 50.000 prescriptions	254	282-494
70-90.000 prescriptions	419	212-414
11-14.000 patients	327	87-221
> 14.000 patients	199	44-158
< 2.500.000 turnover	240	325-553
> 4.500.000 turnover	348	134-305

Table 5.20. Population data outside the calculated confidence bounds.

An additional MANOVA was made for all sample features with a double purpose. Firstly, was it worrisome to have an over-representation or under-representation of a certain category in the sample (the 15 not corresponding subquestions)? For example, **table 5.20** shows that female pharmacy managers were over-represented in the sample. It was tested if female pharmacy managers had a significantly different score for *thought* and *action* compared to male pharmacy managers. Secondly, was there a striking pattern in the scores of a any category? For example, it was tested whether pharmacy managers in urban areas had a significantly different score for *thought* and *action* compared to pharmacy managers in rural areas. The hypothesis of no difference in the means for the different groups for *thought* and *action* in the response group was consequently tested for all 17 main questions with a MANOVA.

The results of the multivariate analyses showed that the scores of 4 out of 17 main questions were significantly different for the groups sex, so-called 'formulas', location, and indirect tasks with a calculated p of .003, .005, .031 and .006 respectively. However, 17 hypotheses were tested. As mentioned before, Stevens (1996: 6-9) notes if *k* hypotheses are tested each with an α of say .05, that we are capitalizing on change. Put in another way: it is not surprising that we have found four significant results. These results might any well be the result of chance, and not of existing differences in the population. Stevens advises to use α/k as an 'overall α' instead of α in these situations. This is also known as the Bonferroni Inequality.[54] As a result, application of the multivariate and univariate tests in combination with the Bonferroni's Inequality results in a statistically non-significant relation between the categories for *profile* and the pharmacy-mix scores of *thought* and *action*. It was hence accepted that over-representation or under-representation was not worrisome, and that no striking pattern in the scores of any category of *profile* was observed.

Conclusion

It was assumed that although a poor correspondence of sample and population was observed for some of the questions, the random sample was a relatively good representation of the population, despite the four initial significant differences in scores. The hypothesis of no difference in the means for the different groups for *thought* and *action* was accepted. In addition, the observed differences between sample and population were accepted to have little importance on the pharmacy-mix scores. Consequently, the results for *thought* and *action* were generalized to all pharmacies in the Netherlands.

[54] The calculated 'overall α' for *thought* and *action* would then be α=.05/17= .002. All of the four significant results mentioned above had a calculated p-value larger than .002; none of the results was significant with the application of an 'overall α '. The results of the univariate analyses showed that the scores of 7 out of 17 questions for 8 pharmacy-mix scores were significantly different for the groups sex (variable product mix *thought*), (in)dependence (variable product mix *thought*), cooperation (variable product mix *thought*), so-called 'formulas' (variable customer mix *thought*), location (variable customer mix *action*), direct tasks (variable customer mix *thought*), indirect tasks (variables product mix and customer mix *action*) with a calculated p-value of .002, .016, .028, .031, .032, .033, .007 and .009 respectively. However, 102 (=number of questions*mixscores for *thought* and *action*= 17*6) hypotheses were tested. The 'overall α' for *thought* and *action* would then be α=.05/102= .0004. All of the eight calculated p-values which would be significant in using the α, were larger than .0004, and therefore these results were not significant in using the 'overall α'.

Appendix 3 A Longitudinal Comparison

Introduction

In the quantitative results of **chapter 6**, the results of supported and non-supported pharmacy managers were compared. What were the differences in the scores of the survey at t_0 and t_1 between the supported pharmacy managers of stichting VNA and SAL Apotheken and the non-supported pharmacy managers? What were the opinions of pharmacy managers about these results?

Surveys

What were the differences in the scores of the survey at t_0 and t_1 between the supported and the non-supported pharmacy managers? The calculation for *thought* and *action* was made in the same way as in **chapter 5**. Using the Friedman test, the result for *thought* showed seven clusters in 1996 of which there were two clusters which were observed only in 1996 (cases 1014 and 254, presented in **table a3.1.**).

group	**ranking**	**case number** **cases in quasi-experiment** (survey)
1.	***product-process-customer***	case 22, 49, 104, 299 **4** (14)
2.	***product-customer-process***	case 54, 57, 79, 96, 122, 129, 138, 139, 143, 159, 160, 162, 164, 166, 167, 171, 189, 194, 196, 201, 218, 226, 230, 231, 239, 1003, 1005, 1030, 1031 **29** (82)
3.	***process-product-customer***	case 1014 **1** (3)
4.	***process-customer-product***	**0** (3)
5.	***customer-product-process***	case 1, 9, 19, 43, 44, 111, 115, 130, 251, 263, 271, 284, 293, 295, 1001, 1002, 1004, 1015, 1029, 1032, 1033 **21** (59)
6.	***customer-process-product***	case 27, 55, 89, 123, 297, 1027, 1028 **7** (12)
7.	***product=process=customer***	case 254 **1** (2)
	total cases thought	**63** (175)

Table a3.1. Ranking of pharmacy mixes for *thought* in the random sample and the selected sample 1996.

Using the Friedman test, the result for *thought* showed seven clusters in 1997 also, of which there were two clusters which were only observed in 1997 (cases 22 and 1002, presented in **table a3.2.**).

group	ranking	case number
1.	***product-process-customer***	case 171 **1**
2.	***product-customer-process***	case 49, 54, 79, 96, 122, 129, 130, 138, 139, 143, 159, 160, 162, 166, 189, 194, 196, 201, 218, 226, 263, 284, 299, 1015, 1028 **25**
3.	***process-customer-product***	case 89, 230, 1014 **3**
4.	***customer-product-process***	case 1, 9, 19, 27, 43, 44, 104, 111, 115, 123, 164, 167, 231, 239, 293, 295, 297, 1004, 1005, 1027, 1029, 1031, 1033 **23**
5.	***customer-process-product***	case 55, 57, 251, 254, 271, 1001, 1003, 1030, 1032 **9**
6.	***(product=customer)-process***	case 22 **1**
7.	***(process=customer)-product***	case 1002 **1**
	total cases thought	**63**

Table a3.2. Ranking of pharmacy mixes for *thought* in random sample and selected sample 1997.

The basis for the results for *action* in the survey of 1996 showed that 16 basic clusters were calculated in the cluster analysis; eight of which were only observed in 1996[55] (14 cases: cases 104, 130, 164, 263, 295, 1002, 57, 96, 297, 9, 139, 231, 251, 1031). The basic clusters were refined to five clusters (**table a3.3.**); one of

[55] The results of 1997 showed that some of the 1996 basic clusters were not observed anymore and some new basic clusters were formed. In the cluster product-customer-process, the basic clusters product>customer≥process and (product≈customer)>process was observed only in 1996, the basic cluster product≥customer≥process was observed only in 1997. In the cluster process-product-customer, the basic cluster process≈product≈customer was observed only in 1996. In the cluster customer-product-process, the basic clusters (customer≈product)>process, customer≥(product=process), and customer>(product≈process) were observed only in 1996, and the basic clusters customer>product>process and (customer≈product)>process were observed only in 1997. In the cluster customer-process-product, the basic clusters customer>(process≈product), customer≈process≈product, and customer>process>product were observed only in 1996. In the cluster process-customer-product, the basic cluster process>(customer≈product) was observed only in 1997. In 1996, 9 out 16 basic clusters were observed only in 1996, with a total of 14 out of 63 cases. In 1997, 4 out 11 basic clusters were observed only in 1997, with a total of 12 out of 63 cases. It should be noted that the basic clusters did not result in major changes in the final clusters. However one cluster, customer-process-product, which contained two cases; was only observed in 1996. In addition, one cluster process-customer-product, which contained four cases, was only observed in 1997.

which was observed only in 1996 (cases 251 and 1031).

basic cluster[56]	**ranking**[57]	**case number**
1.	***product>process>customer***	case 19, 27, 129, 138, 166, 171, 293, 299, 1028 **9** (32)
2.	***product>process≥customer***	case **122**[58], 123, 160, 162, 201, 1005, 1015, 1030 **8** (19)
3.	***(product≈process)>customer***	case 1, 43, 49, 194, 226, 271, 1001 **7** (21)
4.	***product>customer>process***	case 143, 167, 189, 196, 218 **5** (17)
5.	***product>customer≥process***	case 104, 130, 164, 263, 295, 1002 **6** (17)
6.	***(product≈customer)>process***	case 57, 96 **2** (3)
7.	***(customer≈product)>process***	**0** (3)
8.	***process>product>customer***	case 22, 44, 54, 55, 111, 159, 230, 254, 284, 1003, 1004, 1029 **12** (24)
9.	***(process≈product)>customer***	case 89, 239, **1014**, **1032**, 1033 **5** (17)
10.	***process>(product≈customer)***	case 79, 115, 1027 **3** (10)
11.	***process≈product≈customer***	case 297 **1** (4)
12.	***customer≥(product=process)***	case 9 **1** (4)
13.	***customer>(product≈process)***	case 139, 231 **2** (2)
14.	***customer>(process≈product)***	case 251 **1** (1)
15.	***customer≈process≈product***	case 1031 **1** (2)
16.	***customer>process>product***	**0** (1)
total cases *action*		**63** (177)

Table a3.3. Basic clustering of pharmacy mix ratio scores for *action* in the random sample and the selected sample 1996.

[56] The separate clusters are the first clusters produced with the agglomerative hierarchical clustering using the cluster method 'average linkage within groups' and using the similarity measure 'Pearson correlation'.

[57] In general, the first pharmacy mix mentioned had the highest score. The symbols applied are: > and < for larger and smaller than, ≥ and ≤ for larger and almost equal to and smaller and almost equal to, (mix1≈mix2) two mix scores being almost equal.

[58] Cases presented in **bold** and underlined were originally located in another cluster in the calculation with hierarchical cluster analysis.

The basis for the results for *action* in the survey of 1997 showed that 11 basic clusters were calculated in the cluster analysis; three out of which were only observed in 1997 (12 cases: cases 57, 164, 201, 254, 297, 115, 122, 130, 1015, 44, 1001, 293). The basic clusters were refined into five clusters (**table a3.4.**); one of which was observed only in 1997 (cases 115, 122, 130 and 1015).

basic cluster[59]	**ranking**[60]	**case number**	
1.	***product>process>customer***	case 89, 111, 226, 230, 251, 263, 1002, 1005, 1030	**9**
2.	***product>process≥customer***	case 19, 54, 138, 167, 171, 218, 239, 284, 299, 1027, 1029	**11**
3.	***(product≈process)>customer***	case **1028**[61], **1033**	**2**
4.	***product>customer>process***	case 96, 143, 162, 196, 231, 271, 295, 1031	**8**
5.	***product≥customer≥process***	case 57, 164, **201**, 254, 297	**5**
6.	***process>product>customer***	case 1, 22, 27, 79, 123, 129, 159, 194, 1014	**9**
7.	***(process≈product)>customer***	case 9, 49, 55, 139, 160, 189, 1004	**7**
8.	***process>(product≈customer)***	case 43, 104, 166, 1003, 1032	**5**
9.	***process>(customer≈product)***	case 115, 122, **130**, 1015	**4**
10.	***customer>product>process***	case 44, 1001	**2**
11.	***(customer≈product)>process***	case 293	**1**
	total cases *action*		**63**

Table a3.4. Basic clustering of pharmacy mix ratio scores for *action* in the random sample and the selected sample 1997.

Using the results of the Friedman test and the cluster analysis, let us now start with another table to illustrate the correspondence for both *thought* and *action* (**table a3.5.**). An analysis of this table shows that, in general, there are not many changes. We can see a similar result if we compare the cells of 1996 with the same cells of

[59] The separate clusters are the first clusters produced with the agglomerative hierarchical clustering using the cluster method average linkage within groups and using the similarity measure Pearson correlation.

[60] Mainly, the first pharmacy mix mentioned had the highest score. The applied symbols are: > and < for larger and smaller than, ≥ and ≤ for larger and almost equal to and smaller and almost equal to, (mix1≈mix2) two mix scores being almost equal.

[61] Cases presented in **bold** and underlined were originally located in another cluster in the calculation with hierarchical cluster analysis.

1997. For example, for *thought*, the second column product-process-customer shows that 4 cases were in this ranking in 1996 (second row) and 1 case in 1997 (fourth row). Similarly, for *action*, the same second column product-process-customer shows that 24 cases were in this cluster in 1996 (third row) and 22 cases in 1997 (fifth row). If we analyze the material in this way it seems clear that, in general, there are not many changes. However, before reaching this conclusion we have to refine our analysis, since these numbers alone do not give sufficient information about possible changes. Even if comparable numbers would be observed in each cell, the cases could be different. We will thus analyze the change in the pharmacy mix and the change in the correspondence between *thought* and *action* in time in the following tables to check this.

ranking **method**	***product*** ***process*** ***customer***	***product*** ***customer*** ***process***	***process*** ***product*** ***customer***	***process*** ***customer*** ***product***	***customer*** ***product*** ***process***	***customer*** ***process*** ***product***	***(product=*** ***customer)*** ***process***	***(process=*** ***customer)*** ***product***	***product=*** ***process=*** ***customer***
thought **1996** total cases **63**	case 22, 49, 104, 299 **4**	case 54, 57, 79, 96, 122, 129, 138, 139, 143, 159, 160, 162, 164, 166, 167, 171, 189, 194, 196, 201, 218, 226, 230, 231, 239, 1003, 1005, 1030, 1031 **29**	case 1014 **1**		case 1, 9, 19, 43, 44, 111, 115, 130, 251, 263, 271, 284, 293, 295, 1001, 1002, 1004, 1015, 1029, 1032, 1033 **21**	case 27, 55, 89, 123, 297, 1027, 1028 **7**			case 254 **1**
action **1996** total cases **63**	case 1, 19, 27, 43, 49, 122, 123, 129, 138, 160, 162, 166, 171, 194, 201, 226, 271, 293, 299, 1001, 1005, 1015, 1028, 1030 **24**	case 57, 96, 104, 130, 143, 164, 167, 189, 196, 218, 263, 295, 1002 **13**	case 22, 44, 54, 55, 79, 89, 111, 115, 159, 230, 239, 254, 284, 297, 1003, 1004, 1014, 1027, 1029, 1032, 1033 **21**		case 9, 139, 231 **3**	case 251, 1031 **2**			
thought **1997** total cases **63**	case 171 **1**	case 49, 54, 79, 96, 122, 129, 130, 138, 139, 143, 159, 160, 162, 166, 189, 194, 196, 201, 218, 226, 263, 284, 299, 1015, 1028 **25**		case 89, 230, 1014 **3**	case 1, 9, 19, 27, 43, 44, 104, 111, 115, 123, 164, 167, 231, 239, 293, 295, 297, 1004, 1005, 1027, 1029, 1031, 1033 **23**	case 55, 57, 251, 254, 271, 1001, 1003, 1030, 1032 **9**	case 22 **1**	case 1002 **1**	
action **1997** total cases **63**	case 19, 54, 89, 111, 138, 167, 171, 218, 226, 230, 239, 251, 263, 284, 299, 1002, 1005, 1027, 1028, 1029, 1030, 1033 **22**	case 57, 96, 143, 162, 164, 196, 201, 231, 254, 271, 295, 297, 1031 **13**	case 1, 9, 22, 27, 43, 49, 55, 79, 104, 123, 129, 139, 159, 160, 166, 189, 194, 1003, 1004, 1014, 1032 **21**	case 115, 122, 130, 1015 **4**	case 44, 293, 1001 **3**				

Table a3.5. Table of correspondence for *thought* and *action* survey 1996 and 1997.

Table a3.6. gives us a starting point for judging the number of cases in which there was some change in *thought*. However, we are in need of a more refined presentation since we are interested in the origin (1996) as well as the destination (1997) of the pharmacy manager with respect to *thought*.

response	result	stable	change		stable	change		stable	change	
	mix position experimental group	product in position 1	product to position 1	product to pos.2	process in pos.1	process to pos.1	process to pos.2	customer in pos.1	customer to pos.1	customer to pos.2
continuation desired	**VNA/SAL** survey, interviews, questionnaire, observation	1	2	1	0	0	3	3	4	1
	independent survey, interviews	5	1	0	0	0	0	5	2	2
	independent survey	6	0	1	0	2	1	3	4	0
no continuation desired	**independent** survey	6	2	2	0	0	2	2	1	1
total	63 cases	18	5	4	0	2	6	13	11	4

Table a3.6. Change in pharmacy mix position for *thought* survey 1996 and 1997.

The results for *thought* in the survey of 1996 showed that the rankings product-customer-process, customer-product-process, and customer-process-product were selected by most pharmacy managers; in each ranking 29, 21, and 7 cases respectively. A total of 57 out of 63 cases was observed in these rankings. The results of 1997 showed that the rankings were the same: product-customer-process, customer-product-process, and customer-process-product were selected by most pharmacy managers; in each ranking, 25, 23, and 9 cases respectively. The same total of 57 out of 63 cases was observed in these rankings. In general, we observed that most pharmacy managers perceived the product mix and the customer mix as being the most important pharmacy mixes. The results of 1997 showed a similar pattern: again, product and customer were perceived as being the most important pharmacy mixes. The changes in time showed that 31 cases remained in the same ranking: 18 cases in the ranking product-customer-process, 12 cases in the ranking customer-product-process, and one case in the ranking customer-process-product. In addition, 26 cases changed within the main observed rankings: cases with product or customer in the first ranking (compare **table a3.6.** and **figure a3.1.**).

A rough comparison[62] of the change in the rankings of pharmacy managers of stichting VNA and SAL Apotheken (VNA/SAL pharmacy managers) and the other pharmacy managers showed that the differences observed were not very striking. Most results were very similar. However four results were special. Firstly, one case of VNA/SAL pharmacy managers was observed with the product mix stable in the first ranking. At the independent pharmacy managers five or six cases were observed in this category. Secondly, three cases of VNA/SAL pharmacy managers were observed in a change to process in the second ranking. At the independent pharmacy managers zero to two cases were observed in this category. Thirdly, five cases SSM pharmacy managers were observed with the customer mix stable in the first ranking. At the other pharmacy managers two or three cases were observed in this category. Fourthly, two cases of SSM pharmacy managers and one case of nc-pharmacy managers were observed in a change to the customer mix in the first ranking. At both other pharmacies four cases were observed in this category.

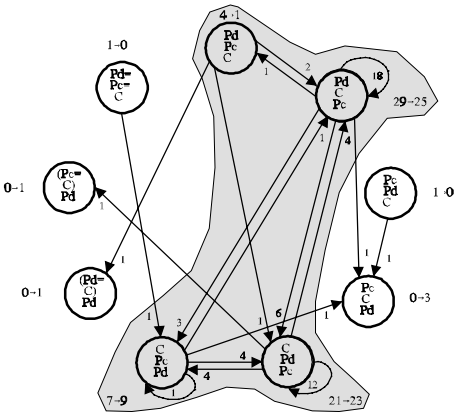

Figure a3.1. Changes in *thought* survey 1996 and 1997.

In general, stichting VNA and SAL Apotheken had fewer pharmacy managers with product stable in the first ranking, but had more pharmacy managers in a change to customer in the first ranking. In addition, the number of VNA/SAL pharmacy managers with product stable in the first ranking, was fewer than the SSM pharmacy managers. In 1997, the results of the product mix showed that fewest VNA/SAL pharmacy managers were observed with product in the first ranking. The results of the process mix showed that the two only cases with process in the first ranking were observed at the c-pharmacy managers. The results of the customer mix showed that fewest nc-pharmacy managers were observed with customer in the first ranking. The other scores were comparable.

[62] The comparison of the differences involved four groups: VNA/SAL pharmacy managers, SSM pharmacy managers (independent managers with whom interviews were performed in using Soft Systems Methodology), c-pharmacy managers (independent pharmacy managers with whom only a survey was performed and which desired continuation), and nc-pharmacy managers (independent pharmacy managers with whom only a survey was performed and who did not desire continuation).

Table a3.7. gives us a starting point for judging the number of cases in which there was some change in *action*. However, again we are in need of a more refined presentation since we are also interested in the origin (1996) as well as the destination (1997) of the pharmacy manager with respect to *action*.

response	**result**	stable	change		stable	change		stable	change	
	mix position experimental group	product in position 1	product to position 1	product to pos.2	process in pos.1	process to pos.1	process to pos.2	customer in pos.1	customer to pos.1	customer to pos.2
continuation desired	**VNA/SAL** survey, interviews, questionnaire, observation	4	4	0	4	1	1	0	1	0
	independent survey, interviews	4	3	0	1	6	1	0	1	0
	independent survey	5	4	0	2	3	1	0	0	1
no continuation desired	**independent** survey	1	3	0	1	6	1	0	1	3
total	63 cases	14	14	0	8	16	4	0	3	4

Table a3.7. Change in pharmacy mix position for *action* survey 1996 and 1997.

The results for *action* in the survey of 1996 showed that 16 basic clusters were calculated in the cluster analysis; these were refined to five clusters, one of which was observed only in 1996. The results of 1997 showed 11 basic clusters which were refined to five clusters also; one of which was

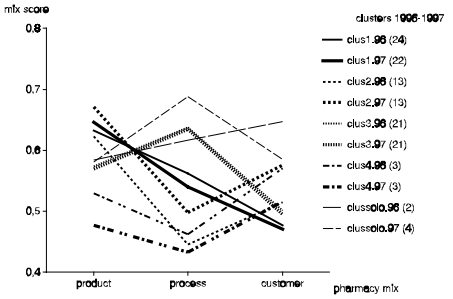

Figure a3.2. Changes in mean scores per cluster for *action* survey 1996 and 1997.

observed only in 1997.[63]

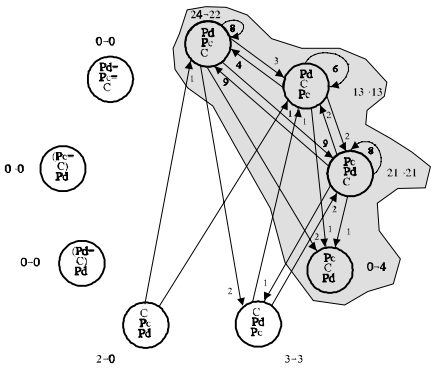

Figure a3.3. Changes in *action* survey 1996 and 1997.

In 1996, the clusters product-process-customer, product-customer-process, and process-product-customer were selected by most pharmacy managers; in each cluster 24, 13, and 21 cases respectively. A total of 58 out 63 cases was observed in these rankings. The results of 1997 showed that the rankings were the same: the clusters product-process-customer, product-customer-process, and process-product-customer were selected by most pharmacy managers; in each cluster 22, 13, and 21 cases respectively. A total of 56 out 63 cases was observed in these rankings. In general, the results showed that most pharmacy managers categorized actions related to the product mix and the process mix. The results of 1997 showed a similar pattern also: again actions related to product and process were performed mostly. The changes in time showed that 22 cases remained in the same ranking: eight cases in the cluster product-process-customer, six cases in the cluster product-customer-process, and eight cases in the cluster process-product-customer. In addition, 33 cases changed within the main observed clusters: these were cases with product or process in the first position.

A rough comparison of the change in the rankings of VNA/SAL pharmacy managers and the other pharmacy managers showed that the differences observed were also not

[63] The results of 1997 showed that some basic clusters of 1996 were not observed anymore and some new basic clusters had been formed. In the cluster product-customer-process, the basic clusters product>customer≥process and (product≈customer)>process was observed only in 1996, and the basic cluster product≥customer≥process was observed only in 1997. In the cluster process-product-customer, the basic cluster process≈product≈customer was observed only in 1996. In the cluster customer-product-process, the basic clusters (customer≈product)>process, customer≥(product=process), and customer>(product-≈process) were observed only in 1996, and the basic clusters customer>product>process and (customer-≈product)>process were observed only in 1997. In the cluster customer-process-product, the basic clusters customer>(process≈product), customer≈process≈product, and customer>process>product were observed only in 1996. In the cluster process-customer-product, the basic cluster process>(customer≈product) was observed only in 1997. In 1996, 9 out 16 basic clusters were observed only in 1996, with a total of 14 out of 63 cases. In 1997, 4 out 11 basic clusters were observed only in 1997, with a total of 12 out of 63 cases. It should be noted that the basic clusters did not result in major changes in the final clusters. However one cluster, customer-process-product; which contained two cases, was only observed in 1996. In addition, one cluster, process-customer-product; which contained four cases, was only observed in 1997.

very striking. Again, most results were very similar. Four results were special. Firstly, one case of the nc-pharmacy managers was observed with the product mix stable in the first position. At the other pharmacy managers, four or five cases were observed in this category. Secondly, four cases of VNA/SAL pharmacy managers were observed with the process mix stable in the first ranking. At the other pharmacy managers one or two cases were observed in this category. Thirdly, one case of VNA/SAL pharmacy managers and three cases of c-pharmacy managers were observed in a change to process in the first ranking. At both other pharmacies six cases were observed in this category. Fourthly, three cases of the nc-pharmacy managers were observed in a change to customer in the second position. At the other pharmacy managers zero cases or one case was observed in this category. In general, stichting VNA and SAL Apotheken had more pharmacy managers with process stable in the first ranking, but fewer pharmacy managers in a change to process in the first ranking. In addition, the number of VNA/SAL pharmacy managers with product stable in the first ranking was more than the nc-pharmacy managers and the number of VNA/SAL pharmacy managers with a change to customer in the second ranking was fewer than the nc-pharmacy managers. In 1997, the results of the product mix showed that fewest nc-pharmacy managers were observed with product in the first ranking. The other scores were comparable. The results of the process mix and the customer mix showed comparable results with respect to the four groups of pharmacy managers.

The analysis of the correspondence for *thought* and *action* showed that most results did not change (compare **table a3.8.**). Eight c-pharmacy managers were observed in the category ‘stable correspondence’, which was more than the other pharmacy managers (four or five cases in this category). Two c-pharmacy managers were observed in the category ‘better correspondence’, which was fewer than the other pharmacy managers (also four or five cases in this category). The number of cases in the category ‘worse correspondence’ was comparable for all groups of pharmacy managers and varied between six and seven cases. In general, we could conclude that the differences observed between the results of *thought* and *action* in 1996 increased in 1997.

	expression of change	**all positions used**[64]			**limited positions used**[65]		
response	**result experimental group**	stable	better	worse	stable	better	worse
continuation desired	**VNA/SAL** survey, interviews, questionnaire, observation	4	4	7	6	3	6
	independent survey, interviews	5	5	6	7	4	5
	independent survey	8	2	6	8	2	6
no continuation desired	**independent** survey	4	5	7	8	3	5
total	63 cases	21	16	26	29	12	22

Table a3.8. Change in correspondence for *thought* and *action* survey 1996 and 1997.

Interviews

What were the opinions of pharmacy managers about these results? The 31 pharmacy managers involved in the SSM sessions were asked to give their comment on the results of 1996 and 1997 in interviews.

In 1996, most pharmacy managers agreed with the results. A total of 18 pharmacy managers agreed with the results for both *thought* and *action*, 10 pharmacy managers only agreed with the results for *thought*, 2 pharmacy managers only agreed with the results for *action*, and one pharmacy manager did not agree with either results for *thought* and *action*. In 1997, a similar pattern was observed; most pharmacy managers agreed with the results. A total of 20 pharmacy managers agreed with the results for both *thought* and *action*, 10 pharmacy managers only agreed with the results for *thought*, and one pharmacy manager did not agree with either results for *thought* and *action*. The acceptance of the results among VNA/SAL pharmacy

[64] Change of correspondence is here expressed with five categories, *no correspondence*, *third position only*, *second position only*, *first position only*, and *complete correspondence*. The applied scale is: no correspondence↔correspondence in third position only↔correspondence in second position only-↔correspondence in first position only↔complete correspondence. A *stable* correspondence is a correspondence within the same category, a *better* correspondence is a change from left to right, and a *worse* correspondence is a change from right to left.

[65] Change of correspondence is here expressed with three categories: *no correspondence*, *limited correspondence* and *complete correspondence*. The applied scale is: no correspondence↔ (limited correspondence meaning: correspondence in third, second and first position only)↔complete correspondence. A *stable* correspondence is a correspondence within the same category, a *better* correspondence is a change from left to right, a *worse* correspondence is a change from right to left.

managers and independent pharmacy managers was comparable.

Some pharmacy managers agreed with the results of the survey. For example, the pharmacy manager of case 001 noted that many daily actions have little relationship to one's actual professional work, but have to be done. 'For instance, financial actions are pushed in the direction of the pharmacy manager; however, I am not educated for that'. In case 054, the pharmacy manager argued that pharmaceutical tasks are the basis of the work in the pharmacy. 'We probably gave even more attention to pharmaceutical tasks last year.' In case 138, the pharmacy manager noted that product actions were in the first place, and that this had been determined historically. 'However, as a pharmacist you have to control various issues. In this respect process actions are inevitable'.

Some pharmacy managers did not agree with the results of the survey. For example, in case 043, the pharmacy managers argued that the customer should be in the first position for action. A lot of time was spent on the customer. They had problems with the fact that product, process, and customer were in conflict with each other. 'In this pharmacy we think a lot about our customer policy, for example, developments with respect to cooperation with the hospital and training of the personnel. In addition, the fast collection of prescriptions is important in our daily work'. In case 254, the pharmacy manager noted that he partially agreed with the results for action. Process actions were indeed mainly at the front, especially in the last two years, since he had joined the partnership. In this period the reorganization was mainly related to money. 'However, I work a lot with training personnel and with pharmaco-therapy at the moment'. He also pays a lot of attention to the role of the customer, for example, via the projects of the KNMP and the reconstruction of the pharmacy, and the introduction of the counter model. In case 1005, the pharmacy manager said that the results had surprised him. He noted that he did not spend much time on either product, process, or customer actions. He spent most of his time on personnel problems related to the organization of the 24-hour service. 'During the last months I have not worked as a pharmacist, but as a confidant.'

Conclusion

We can distill from our analysis above that the results of the quantitative survey of 1996 and 1997 at 63 pharmacy managers suggested that no striking or 'alarming' differences between supported and non-supported pharmacy managers were present. Moreover, the interviews in the quasi-experiment showed that most of the participating pharmacy managers agreed with the survey results. We would therefore conclude that the difference between supported and non-supported pharmacy managers was minimal for the modelled change to the customer mix.