

Evaluation of microcomputer utilization in small- and medium-sized businesses

J.J.D. Havenga* and P.J.S. Bruwer

Faculty of Economics and Management Sciences, Potchefstroom University for CHE, Potchefstroom, 2520
Republic of South Africa

This paper presents the result of an empirical study on the use of microcomputers by small and medium-sized businesses in South Africa. A number of countries were included in the survey. The purpose of this study was to establish, through the use of 51 variables in the project, what major problems small and medium-sized businesses experience in the use of microcomputers in a developing region such as southern Africa. Special emphasis was placed on the main reasons for purchasing microcomputers, types of software used, as well as training and experience in handling this equipment in the management of a small business. Major findings included a greater computer literacy amongst users, with a strong tendency towards computer application for more sophisticated purposes such as decision making means of support.

Hierdie artikel bied 'n samevatting van die resultate van 'n empiriese studie oor die gebruik van mikrorekenaars deur klein- en mediumgrootte sakeondernemings in Suid-Afrika. Die doel van hierdie studie was om vas te stel wat die belangrikste probleme is wat klein- en mediumgrootte sakeondernemings ervaar by die gebruik van mikrorekenaars in 'n ontwikkelende streek soos suidelike Afrika. Spesiale klem is geplaas op belangrike redes vir die aankoop van mikrorekenaars, soorte sagteware wat gebruik word sowel as opleiding en ervaring in die hantering van hierdie toerusting in die bestuur van kleiner sakeondernemings. Die belangrikste bevindinge het onder andere ingesluit 'n groter rekenaargeletterdheid onder gebruikers met 'n sterk neiging tot die benutting van die rekenaar vir meer gesofistikeerde doeleindes soos besluitneming.

* To whom correspondence should be addressed

Since the introduction of the microcomputer in the middle 1970s the technological advancement in its speed and storage capacity has been great. Greater awareness of the possibilities of new generation microcomputers as well as lower cost of hardware have caused an increasing demand among small- and medium-sized businesses to employ microcomputers in their firms. However, it does seem as if the greater demand for microcomputers has not always resulted in a more efficient utilization thereof. It is suggested (Massey, Jr., 1986) that the small business computer remains underutilized and that the benefits of computer technology to small businesses will not be fully realized until managers combine the already recognized cost savings with the tremendous revenue generation capacities that microcomputers offer.

Besides the under-utilization Cragg (1986) also noted that some studies have indicated that a high percentage of microcomputers have been purchased unwisely or have fallen into non-use. The latter can be the case if no technological development of microcomputers occurred, or due to lack of training of users.

It does, however, seem that microcomputers are being engaged to a larger extent in more areas than actually acknowledged (Lincoln & Warberg, 1987; Cragg, 1987).

The purpose of this study is to ascertain the main reasons for purchasing a microcomputer in order to assess to what extent problems are experienced, and the contribution of microcomputer utilization to more effective managerial functioning in small and medium-sized businesses in southern Africa.

Definition of small- and medium-sized businesses

From the survey of the literature it is evident that confusion still exists on a large scale as to what the correct definition of a small business should be. The

official definition of a small business in the U.S.A. was already formulated in 1953 with the introduction of the 'Small Business Act'. Since then 24 other definitions were formulated, whilst a number of variations on the original definition were coined. This also implies the case with the definition of the Bolton Commission in the U.K.

For the purposes of this study small- and medium-sized businesses were defined in terms of annual turnover as well as current value of capital investment being less than R5 million; number of employees less than 200; and number of branches five or less. The authors preferred to classify the businesses as medium and small, because in some countries medium-sized is considered to be small and in others vice versa. Throughout this article the term small business will be used to denote both medium and small.

Method and sample

The method of study covered a review of literature as well as an empirical survey. A questionnaire was developed taking into account information gathered from the literature and discussions with people in the small business field.

The questionnaire which includes 51 variables was screened carefully and pretested.

In a previous research project (Bruwer & Pretorius, 1986) a questionnaire of limited span, 14 variables, was developed. This served as a basis for this project.

The seven-point scale that has already proven to be very successful in research (Lucas, 1975; Bailey & Pearson, 1983) was also used in this project.

In order to obtain a representative sample of small businesses in southern Africa using microcomputers, a direct mail list was obtained from the Small Business

Table 1 Ownership of microcomputers

Type of business	With own system	Without own system
	%	%
Printing	2,6	2,4
Manufacturing	13,2	7,3
Butchery	2,1	12,2
Medical and Pharmacies	9,4	2,4
Electrical appliances	15,7	1,8
Electronic (Radio, TV)	1,0	0,6
Clothing	2,1	12,2
Furniture	6,3	2,4
Building Materials	2,1	7,3
Gifts	5,2	3,7
Repair Services	3,1	6,9
Automobile Retailers	10,5	4,9
Other Businesses	26,7	35,9
Total	100	100

Advisory Bureau and the Institute for Entrepreneurship and Small Business. These organizations function throughout southern Africa and are situated at the Universities of Potchefstroom and Stellenbosch, respectively. Countries included in the random sample were Lesotho, South Africa, Namibia, Swaziland, and the independent states of Transkei and Bophuthatswana.

From a list of 4613 names the authors eliminated 791 firms which were either known, suspected, or could be deduced to be large businesses. A random sample of 1000 names was drawn. A total of 391 questionnaires (39,1% response) were sent back of which 11 were discarded as unusable. From this response it was established that 216 businesses had their own microcomputers, representing 56,8%. However, it can not be generalized because the authors believe that quite a number of small businesses that do not own microcomputers, did not respond.

Table 2 Microcomputers in use

Microcomputer	1984	1987
	%	%
Commodore	25,7	9,9
Apple	18,0	3,1
IBM-PC	8,0	17,3
Sharp	6,0	2,1
Olivetti	5,3	12,0
BBC	1,0	1,0
Sperry	1,0	4,2
ICL	1,0	6,3
Cannon	1,0	1,6
Hewlett Packard	1,0	1,0
Epson	1,0	1,0
Other IBM-compatibles	—	24,6
Others	—	16,2

Table 3 Main reasons for purchasing a microcomputer

Reason	1984	1987
	%	%
Cost saving	6,0	5,2
Reduction administrative workload	51,4	14,1
Personnel saving (reduction)	0,9	1,6
Administrative control	17,8	28,3
Agent's presentation	2,9	—
Better planning/decision making	—	23,0
Better control	—	22,0
Other	11,0	5,8

Statistical analysis of data

The BMDP-programmes (Dixon & Brown, 1981) were mainly used for the processing and analyzing of the statistical data.

Variables used in the project

Appendix A contains the names and meanings of each of the variables set in the questionnaire. For the average response and standard deviation regarding certain variables as stated in Table 5 one has to refer back to appendix A.

Survey results

Ownership of microcomputers

In Table 1 an indication is given of the various kinds of businesses represented in the study as well as the percentage respondents that have their own microcomputer systems. The respondents who do not own microcomputers are for comparative reasons also included in this table.

The average turnover of the total population of businesses in the study lies between R500 001 and R1 million. The average present value of capital invested can be placed in the same category.

Businesses that have microcomputer systems on average employ between 11 and 50 persons whilst 61% of the non-users employ between one and 10 persons.

In so far as number of branches is concerned, 62,3% of the businesses have no branches and 33% between one and five. In the case of non-users the percentages are 67,7% and 29,9% respectively.

Table 4 Time-lapse and problem experience

Time	1984	1987
	%	%
0-2 Weeks	55,0	29,3
2-4 Weeks	14,0	7,9
1-3 Months	11,0	17,3
More than 3 months	20,0	45,5

A comparison between 1984 figures (Bruwer & Pretorius, 1986) and the present study regarding type of microcomputers in use, reveal definite changes in market-share of the various types. It can be seen in the period 1984–1987 (Table 2) that the Apple system has nearly disappeared from the southern African market-scene, whilst there has nearly been a 100% increase in IBM-PC's. Olivetti had a percentage growth from 5,3% to 12% and Commodore a decline from 25% to 9,9%. In 1987 IBM-compatible computers, manufactured mainly in Taiwan, Hong Kong, and locally, accounted for 24,6% of the market.

The largest percentage of businesses (27,2%) purchased their microcomputers in a price-range R10001–R15000. More sophisticated systems costing R30 000 and upward were acquired by 14,1% of the businesses.

Main reasons for purchasing microcomputers

Table 3 supplies the main reasons for purchasing microcomputers. From this table it is evident that reducing the administrative workload in 1984 was the main reason. In 1987 the respondents gave better planning, control, and decision making as main reasons. It does seem that the small businessman is accepting the value of management information systems and the extent to which microcomputers can be used.

Time-lapse and problem experiencing

The authors also tried to establish what the time-lapse is before small businesses experience their first problems

Table 5 Average response regarding certain variables

Variable	Average	Standard deviation
PROB	3,1	0,11
PROG	3,2	0,13
APP	2,4	0,09
POWER	2,6	0,12
IGNO	3,2	0,12
SERV	2,6	0,13
EXPROB	2,4	0,11
MANAGE	5,0	0,12
DMIN	5,6	0,09
DEC	4,1	0,14
PLAN	2,9	0,14
PROD	4,5	0,11
AGENT	4,4	0,13
AGENTR	5,0	0,11
REDAD	4,8	0,12
COSTR	4,2	0,12
PERS	3,0	0,13
CONTR	5,3	0,11
DECLPLAN	4,4	0,13
ACON	5,1	0,11
SUFF	3,9	0,12
FAM	5,1	0,10
SUCC	5,4	0,08

Table 6 Types of software programs used

Software programs	Percentage users %
General sales ledger	60,7
Debtors	81,7
Creditors	52,9
Stock control	42,9
Salaries and wages	32,5
Word processing	36,1
Planning	24,1
Others (Spreadsheets, sales analysis, etc.)	22,0

with microcomputers. From Table 4, taking the period 1984–1987 into account, it became evident that a change has occurred in the problems experienced. At present 45,5% of the problems are experienced after more than three months. During the 1984-survey 55% of the problems were encountered within the first two weeks.

Response on seven-point scale questions

Table 5 contains the abbreviations of aspects that had to be evaluated on a seven-point scale. These results will be discussed together with those of Tables 6 and 7. These tables contain information regarding the software programmes being used, as well as training and experience.

Discussion of results

Scrutinizing the results presented above reveal that principal users of microcomputers are small businesses in

Table 7 Training and experience of users

A: Formal training	Percentage	
None	57,1	
School	4,7	
Technicon	1,6	
University	7,9	
Computer courses	28,8	
B: Training on present computer system		
One day or less	25,1	
1–5 Days	38,7	
6–10 Days	11,5	
11 Days or more	24,6	
C: Experience	Present system	In total
1 Day–1 Month	1,0	4,2
1–2 Months	4,7	2,1
+1–6 Months	11,0	9,9
+6–12 Months	14,1	8,4
+1–2 Years	24,6	19,9
+2–5 Years	37,2	40,8
+5 Years and longer	7,3	14,7

the manufacturing, electrical, automobile, and medical fields.

Significant changes have also occurred in the type of computers used with major shifts toward products of countries from the East. The decline in the Apple and possible decline in other USA-computers in the near future may be the result of the withdrawal of these companies from the market of the Republic of South Africa.

From the study it also became evident that under-average problems are experienced (refer Table 5). Furthermore, the microcomputer system also contributes to a larger extent to ease management, planning, and decision-making problems. Administrative work is also simplified by the microcomputers and it contributes to an increase in overall productivity. A study conducted by Cragg showed that benefits gained from computerization were: time-saving/ease; better information, and cost saving (Cragg, 1986). Where small businesses employed less than 20 persons, Gunther Rühl (1982) saw the main benefits in the fields of production and sales. In businesses with more than 20 employees the benefits also extended to administrative tasks.

The problems experienced also changed significantly. This can be attributed mainly to the technological advancement in hardware and expansion of software over the past few years. Although training in the use of microcomputers is still not adequate, it can be deduced that there has been a dramatic improvement which also contributes to less problems being experienced.

The application of the microcomputer by small businessmen shows that it is mainly used for debtor systems (81,7%). General sales ledger systems (60,7%) are also used quite extensively. The 24,1% respondents who use it for planning purposes indicate that small businesses realize the value of management information and its generation through microcomputers. The data regarding formal training, presented in Table 7, may directly relate to this.

In the past few years since the microcomputer was introduced to the small business sector a reasonable percentage (55,5%) of employers and employees gained experience of two years and longer. This fact, together with the fact that 38,3% users had formal training beyond school level, mainly contributed to the extent of success achieved with microcomputers in the small business sector. From Table 5 it can be seen that an average response of 5,4 on the seven-point scale was recorded in so far as the 'total success' of microcomputers is concerned.

Conclusions

The level of microcomputer usage in southern Africa is increasing rapidly and microcomputers are being used more and more as a decision making means of support. Due to larger enrolment in computer courses users are also becoming more computer literate.

Small businessmen experience less problems with their

microcomputer systems than a few years ago and microcomputers are being used for more sophisticated purposes than previously.

Taking into account the greater complexity of the market and the increasing and tougher competition, the quest for more sophisticated management with the support of microcomputers is becoming greater. This situation in turn necessitates further research on aspects such as structure of information services, end user-computing, information systems planning, and decision support systems for small businesses (Cooley, Walz & Walz, 1987).

References

- Bailey, E.J. & Pearson, S.W. 1988. A tool for computer user satisfaction. *Manage. Sci.*, vol.29, 530.
- Bolton, J.E. 1971. Small firms. *Report of the Committee of Enquiry on Small Firms*. London, G.B. Her Majesty's Stationary.
- Bulloch, J.F. & Hertz, L. 1982. An international acceptable small business definition. *Intern. Small Business Confer.*, Madrid.
- Bruwer, P.J.S. 1984a. A descriptive model of success for computer based information systems. *Inform. Manage.*, vol.7, Amsterdam; North Holland Publ. Co.
- Bruwer, P.J.S. 1984b. User satisfaction, user attitudes and the success of a computer-based information system. *Proc. Intern. Computer Symp.*, vol. 1, Tamkang University, Taipei, Taiwan, p. 189.
- Bruwer, P.J.S. & Pretorius, C.E. 1986. 'n Ondersoek na die aanwending van Mikrorekenaarsstelsels in klein sakeondernemings van Suid-Afrika. *S. Afr. Tydskr. Bedryfsl.*, vol.17, 125-129.
- Cooley, P.L., Walz, T. & Walz, B. 1987. A research agenda for computers and small business. *Am. J. Small Bus.*, vol.11, 31-42.
- Cragg, P. 1986. Microcomputers and small firms in New Zealand. *Intern. Small Bus. J.*, vol.5, 41-46.
- Dixon, W.J. & Brown, M.D. 1981. *BMDP-81 Biomedical Computer Programs, P-series*. Berkeley, Los Angeles. University of California Press.
- Lincoln, D.J. & Warberg, W.B. 1987. The role of microcomputers in small business marketing. *J. Small Bus. Manage.*, vol.25, 8-17.
- Lucas, H.C., Jr. 1975. *Why information systems fail*. New York, Columbia University Press.
- Massey, T.K., Jr. 1986. Computers in small business: a case of underutilization. *Am. J. Small Bus.*, vol.11, 51-59.
- Nickell, G.S. & Seado, P.C. 1986. The impact of attitudes and experience on small business computer use. *Am. J. Small Bus.*, vol.10, 37-48.
- Rühl, G. 1982. The role of the microcomputer in small firms. *Proc. of the Rencontres de St Gall*, St Gallen, Switzerland, RE23, 1-4.
- Schweizerisches Institut für Gewerbliche Wirtschaft 1982. Bericht über die diskussion zu traktandum 23: Kleincomputer im Gewerbe. *Proc. of the Rencontres de St Gall*, St Gallen, Switzerland, RE23, 1-6.

Appendix 1 Variables used in the project

Variable	Meaning
BRANCH	Number of branches
COMP	Does the firm have a computer system or not?
WHO	Who works with the computer system?
TYPE	Type of computer system
WHY	Main reason for buying the computer system
TIME	How long the computer system has been in use
BEFORE	How was the work presently done by computer previously done
PROB	To what extent have problems been encountered
LONG	How long after purchase were the first problems experienced?
PROG	To what extent were software problems experienced?
APP	To what extent were hardware problems experienced?
POWER	Problems as a result of power failures
IGNO	Problems as a result of ignorance
SERV	Problems as a result of poor service by the supplier or agent
EXPROB	To what extent are problems still being experienced?
FISRT	Is it the first computer system purchased?
PREV	If it is not the first system, what system was used previously?
REASON	Main reasons for the replacement of a computer system
MANAGE	To what extent the computer system simplifies managerial, planning, and decision-making tasks
ADMIN	To what extent administrative work is simplified
DEC	To what extent computer output is utilized for decision-making purposes
PLAN	To what extent planning software is used
SPROG1	If the firm uses a general ledger system
SPROG2	If a debtor's system is used
SPROG3	If a creditor's system is used
SPROG4	If a stock control system is used
SPROG5	If a salary or wages system is used
SPROG6	If a word processing package is used
SPROG7	If planning packages are used
SPROG8	Any other applications
PROD	To what extent productivity is increased by the computer system
AGENT	To what extent the service rendered by the agent or supplier was satisfactory
AGENTR	To what extent the computer lived up to agent's representations
REDAD	To what extent the computer system reduced administrative work
COSTR	To what extent cost reduction was achieved by the computer system
PERS	To what extent personnel reduction was achieved by the computer system
CONTR	To what extent better control resulted from the computer system
DECPLAN	To what extent better decision-making and planning resulted from use of the computer system
ADCON	To what extent better administrative control is possible with the computer system
PER	How long the present computer system has been in use
TRAIN	Formal computer training received by employee using the computer system
EXPER	Experience of the person using the computer
PRES	Amount of training received to operate present computer
SUFF	To what extent the training was sufficient
FAM	Familiarity with the computer system
SUCC	Evaluation of the total success of the present computer system
BUS	Type of business
TURN	Annual turnover
INVEST	Capital investment in business
EMP	Number of employees
COSTS	Total cost of computer and software