Early Computing and Data Processing in Malta

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Abstract: *Malta has been a heavy user of computers only since the 1980s, following the availability of the personal computer. Before that date, the diffusion of computers in Malta was slow. This paper describes the supply and application of computers from the late 1960s until the early 1980s. The state of computing and the slow take-up of computers is analysed and explained. The paper concludes with an explanation for 'take off' in the 1980s.*

Keywords: *applications, computers, data processing, economics of scale, Gross Domestic Product, take up, time-sharing.*

A Brief Introductory History

Computing in Malta can be traced back to 1947 when the British Tabulating Machines company (BTM, later to become ICL) opened an office in Valletta and introduced its first automatic data processing (ADP) system in a local brewery that same year.[1] This was followed three years later by another installation at the Central Office of Statistics (now the National Statistics Office), the first government department to adopt punched-card machines.[2] At that time, apart from BTM, the leading international office equipment and computer firms of Olivetti and the National Cash Register (NCR) were also each separately represented locally. These three companies (BTM and the two local agents) continued operating in Malta well into the 1990s and therefore played an important role in bringing computing within reach of the public and private enterprise.[3] For many years ICL (and to a lesser extent NCR) computers accounted for the majority of local computer installations. ICL and NCR's local agents were also the first companies on the island to offer data processing and programming courses.[4]

In Malta, the late 1960s may be considered as the period when the first signs of the computer's importance became visible. This period saw a handful of relatively short-lived small firms attempting to move into the punched-card data processing

[1] Anon., 'ICL (Malta)', *Informatics*, 12, 1985, Malta, p. 13.

[2] M. Aloisio, 'Computing at the Malta Statistics Office, 1947–1970', *IEEE Annals of the History of Computing*, July–September 2007, Vol. 29, No. 3, pp. 49–61.

[3] ICL was sold to Standard Telephones and Cables (STC) in 1984 and closed its Malta office in the late 1990s after it was taken over by Fujitsu.

[4] NCR's local representative is Philip Toledo Ltd. and that for Olivetti is Charles A. Micallef Ltd., both still operating.

field. Two companies, in particular, set up punched-card operations, acting as bureaux for overseas companies, importing blank cards and re-exporting them after punching. They were, in effect, among the first computing services companies in Malta. Very little is known about these companies and the reasons why they were created and how they actually operated has yet to be investigated.[5]

The late 1960s was also the period when government took steps to investigate efficiency in the civil service. Under the auspices of the United Nations Bureau of Technical Assistance Operations, a UN expert was appointed for this task. The terms of reference were to survey the existing administrative structure and services common to all departments with a view to promoting greater efficiency and coordination[6] and to develop a training programme for civil service personnel to ensure greater uniformity of performance in the field of organization and methods (O&M).[7] O&M also covered electronic data processing (EDP) development, and an entire chapter was therefore devoted to EDP in the study reports. Following the initial report's recommendations, an extensive study was undertaken by the Efficiency Development Branch (EDB) of Establishments, a division within the Office of the Prime Minister, on how best to tackle computerization. In carrying out their investigations, the EDB were helped by staff from the Central Office of Statistics who had experience of programming tabulating equipment since the 1950s. In 1970, a cabinet decision was taken to centralize a number of departmental activities by purchasing a computer sufficiently powerful to serve the needs of government departments as well as of state bodies like the Malta Drydocks, the Central Bank, the Malta Development Corporation, the University, and the Polytechnic (the former MCAST). That, at least, was the intention. However, in spite of the considerable effort that went into this initiative (government personnel having also been sent abroad for training in systems analysis and programming), the project was (sadly) never realized when a new government with a rather negative attitude towards computers was elected in the summer of 1971.

For reasons that will probably never be ascertained but only contemplated – although some might, perhaps justifiably, argue that part of the reason for this state of affairs was government indifference – few developments can be identified in the 1970s, although at least two were 'sizeable' undertakings. These include the computerization of Barclays Bank in 1973 followed by that of the Inland Revenue in

[5] The only reference to these companies in the local press the author has been able to find is a short article about the intention of setting up one of them and some adverts for recruiting data entry (female) clerks. See, for example, 'Computer Services', *Times of Malta*, 25 September 1968, p. 20.

[6] G. Westermark, *Report on Efficiency Development in the Malta Government*, September 1970, p. 2. NAM:GMR 3252, National Archives of Malta; and Anon., 'Computer ghall-Gvern', *Ir-Review*, Malta, 10 April 1971, p. 8.

[7] The investigation into government efficiency was nothing new, the field of Organization and Methods (O&M) having received much attention in Britain all through the 1950s and 1960s. See, for example, J. Agar, *The Government Machine*, Cambridge, Massachussetts, 2003, Chapter 8.

1976. Barclays Bank was the largest bank operating in Malta at the time, employing hundreds of local workers. Its Malta division was sold in 1975 to the Maltese government and Mid-Med Bank (later privatized and purchased by HSBC) thus came into being. The introduction of a computer by this bank made news in Malta,[8] apparently more so than when computerization was introduced at the Inland Revenue although a case study of the latter might well prove more interesting than that of the bank in view of government's stand and computer policy (or lack of it) at the time.

By 1980 a number of computer firms began to appear, some set up specifically to provide time-sharing services, a few others specializing in minicomputer installations and custom software. These companies' founders had vision and realized the computer's potential and the many uses it could be put to even in a small market such as that of Malta. They knew that the island could not possibly escape the information technology revolution. These companies may have appeared late internationally but were early enough on the local scene to establish themselves as business technology leaders. Few, if any, who started up in the late 1970s and early 1980s did not fare well; they went on to beat the masses of small computer firms that were eventually to proliferate as a result of the PC by just a few years, and in so doing acquire a reputation that effectively secured a stronghold for at least the next two decades. Part of their success also lay in the fact that they specialized in market niches in which, over a few years, they developed capabilities against which it was difficult for the newcomers to compete. Some of these companies have become 'national champions' and now have revenues exceeding two million Euros. Table 1 lists these companies in order of formation date.

Table 1 Computer companies operating in Malta on or before 1982[a]

Company	When Established	Type of Business	Make Represented
Charles A. Micallef	1882	oe, tk	Olivetti
ICL (Malta Branch)	1947[b]	tk, c&t, m	ICL
Philip Toledo	1949	oe, tk, c&t	NCR, H-P
Megabyte	1979	tk, c&t	DEC, Altos
Computime	1980	tsb, tk	DEC
Business Development Systems	1981	tk	Apple, Honeywell
Intercomp Data System	1981	tk	Data General
Management Computer Services	1981	tsb	
Panta Computer	1982	c&t, tsb	Prime

Source: Compiled by author from local newspaper articles and *Inforrmatics* magazine.
Key: c&t = consulting and training
m = manufacturing
oe = office equipment vendor
tk = turnkey
tsb = timesharing/bureau
Notes: a. Only the major players are listed.
b. This is the date when the company opened its Malta office.

[8] A number of articles appeared in the local press before and after the Bank's computer centre began to function. See, for example, Anon., 'Barclays to build computer centre at Qormi', *Times of Malta*, 21 July 1972, p. 24.

The year 1981 was a watershed year for computing in Malta because, apart from the formation of a few computer companies, the government computer centre was officially inaugurated and, only weeks before, the first electronics fair (in which a number of computers were displayed to the public) was organized.

Housed in a complex that used to form part of NATO's Western Telegraphy Network, the Government Computer Centre[9] was set up 'to provide a service for all government departments, banks, and established parastatal organizations on a sound business basis'.[10] The Centre's project manager was an Australian of Maltese origin seconded to the Malta government specifically to set it up (but also, subsequently, to run it). Apart from expert assistance provided by the equipment vendors, the coordination of a number of government departments was sought in the initial stages of the project and computer staff users at Mid-Med Bank, the Inland Revenue Department, and the Central Office of Statistics were therefore seconded for the task. Initially, the Centre's scope was rather narrow, carrying out government-related data processing activities, but training and consultancy services were later provided. Eventually, the Centre also started commissioning software from local computer firms (e.g. the outsourcing of the Public Lotto Computerization to a private firm). The heart of the Centre was a Prime 750 minicomputer with Hazeltine terminals and a number of Hewlett-Packard peripherals.

The opening of the Computer Centre and the *Elektronica* fair can probably be considered as the two events that more or less concluded one period of computing history in Malta and started another. Beginning from 1982, a business computer exhibition was held annually, the number of computer suppliers and users multiplied, and government's negative attitude began, very slowly, to abate.

Data Processing Installations, 1947–1982

Table 2 (on p. 90 *infra*) shows a list of data processing and computer installations in Malta for the period 1947–1982, both years inclusive. A similar list done for many developed countries for only part of the period considered would run into hundreds or thousands,[11] but for a tiny place like Malta having a population of

[9] 'Government Computer Centre', *Times of Malta (Supplement)*, 18 November 1981. See also 'The Government Computer Centre', *Informatics*, 1, 1982, Malta, p. 20.

[10] Mifsud notes that the relative remoteness of the Centre from the hub of civil service and commercial activity on the Island may have strengthened the sense that Maltese society was to be protected from 'contamination by this dangerous job-destroying technology'. At the same time, the establishment of the Centre—which led to the emergence of a tightly knit computing community—also effectively broke the ban on computers. A. Mifsud, 'Computing in Malta', in C.C. Vella (ed.), *The Maltese Islands on the Move*, Malta, 2000.

[11] According to a study by the Diebold Group, there were almost twelve thousand computers installed in 1966 in the UK, France, Germany, and the Benelux countries, split up as follows: 5,000 in

under half a million and, at that time, few firms large enough to afford a computer, one expects the numbers to be small.

A number of observations can be made from Table 2. Firstly, it will be noted that ICL had the largest share of the market. As mentioned earlier, this was the first computer company to set up operations in Malta. Distinctively missing from the list is Olivetti, even though this company has been represented locally for at least as long. However, Olivetti has traditionally always concentrated more on office equipment such as typewriters and accounting machines. Until the late 1960s, when the Olivetti Programma P101 was produced in quantities, the company did not offer any commercially inexpensive computer. Often, accounting machines such as the Auditronic 730 served most businesses' needs well enough for the businesses not to have to spend a fortune on a computer system.

The second point to note is that, excluding the Univac 1004, which was more of a punched-card data processor, albeit programmable and with a small core memory, the first true computer system was not implemented until 1973. This would seem to be – and is by international standards – rather late, but it must also be remembered that in the preceding decade, few commercial computers at a price that was within reach of small-to-medium sized companies (e.g. employing between 10 and 50 persons) were available. In Malta, where wages were miserably low in comparison to most developed countries, a typical entry-level cost price of, say, US$60,000 for a 1970 computer represented the equivalent of the combined yearly income of about 30 workers.[12] Few companies therefore could afford to install a computer system, even if they actually needed one. For illustrative purposes only and in order to gain an idea of the 'economies of scale', Tables 3 and 4 give, respectively, the Maltese population and GDP, and Maltese company sizes in the manufacturing sector, vis-à-vis the UK.

Germany, 3,000 in Britain, 2,600 in France, and 1,400 in Belgium and the Netherlands. *Times of Malta*, 21 March 1967, p. 11. See also Table 5-1 of K. Flamm, *Creating the Computer – Government, Industry and High Technology*, Washington, D.C., 1988, p. 135.

[12] In the mid-1960s, the American company Digital Equipment Corporation (DEC) introduced its PDP-8 minicomputer at the relatively cheap price of US$18,000. This computer was very popular for scientific and dedicated applications such as factory process automation, and its success essentially started the minicomputer era. However, larger business computers such as those typically used in Banks and Insurance companies cost much more, and US$60,000 for a small, entry-level mainframe computer of the mid- to late-1960s (e.g. IBM's System 360, and Honeywell's Model 200) was not atypical.

Table 2 Data Processing Installations in Malta, 1947–1982.

Year Installed	Where Installed/User	Type of Business	System	What Used for/ Application
1947	Simonds Farsons Cisk Ltd	Brewery	Tabulating[a]	Costings; Payroll
1950	Central Office of Statistics	Government	Tabulating	Statistics
1960	Dockyard	Ship repair	Tabulating	Costings; Payroll
1962	Archbishop's Curia	Ecclesiastical	Tabulating	Costings
1966	Central Office of Statistics	Government	ICT Univac 1004	Statistics; Billing
1970	Central Office of Statistics	Government	ICT Univac 1004[b]	Statistics; Billing
1972	Barclays Bank	Banking	ICL 1902A	Accounting
1973	Dockyard	Ship repair	ICL 1901A	Costings
1976	Inland Revenue	Government	ICL 1901A	Payroll; Tax Returns
1977	Mid-Med Bank	Banking	ICL EDS 60	Accounting
1978	Foster Clark Products	Manufacturing	ICL 1501-43	Inventory; Payroll
1979	Drydocks	Ship repair	NCR 8250/70	Costings
1979	Dowty (Malta) Ltd[c]	Manufacturing	ICL 2903	Manufacturing Control
1980	Computime Ltd	Computer Bureau	DEC PDP Series	Time-sharing
1981	MCS Bureau Ltd	Computer Bureau	ICL 2903 ?	Time-sharing
1981	Panta Computer Ltd	Computer Agent/Bureau	Prime 50 Series	Time-sharing
1981	Intercomp Ltd	Computer Agent/Bureau	DG Nova Series	Time-sharing
1981?	Mira Motor Sales Ltd	Auto Dealer	DG Nova 3	Inventory; Credit Control
1981	Government Computer Centre	Government	Prime 750	Various
1982	Gasan Group Ltd	Auto Dealer/Insurer	ICL ME29	Inventory; Budget Control
1982	Miaco International Aviation	Aviation	ICL ME29	Inventory

Source: Compiled by author from local newspaper articles and *Informatics* magazine.
Notes: a. Conventional tabulating punched card equipment supplied by BTM.
b. Later removed and reinstalled at GIE.
c. Formerly Malta Rubber Ltd.

Perhaps somewhat abysmal is the small number of computer systems implemented all through the 1970s. Even given Malta's size one would have expected—at least from about the mid-1970s onwards when minicomputers had become popular and the price of computers in general had fallen significantly compared to a decade earlier—to find a few more computer installations. Is it possible to account for this bleak picture? The answer is yes and no: yes, because of the then government's disinterest in technology, no because even if government had shown enthusiasm, there is no way of knowing with certainty if the picture would have been any different. It must be remembered that the 1970s coincided with an oil crisis and a world recession, which affected Malta too, although perhaps not as severely as some other countries.[13] Additionally, fears of mass unemployment

[13] Actually, it was fortunate for Malta that West Germany—one of the few countries that turned out to be the most resilient to the upheaval to which the industrial world was subjected—invested heavily in Malta during this period. See, for example, E. Mizzi, *Malta in the Making 1962–1987 – An Eyewitness Account*, Malta, 1995, pp. 186–7.

as a result of computerization—also promoted by the cybernetics pioneer Norbert Wiener as early as 1949—were widespread in the 1970s. Given that the government of the day had the added problem of the British Forces run-down on its hands, whereby alternative employment had to be found for the thousands of Maltese workers engaged with the British Services, government's concern about unemployment was justified. The unemployment problem was further exacerbated when, following the oil crisis, Britain and Australia—the countries to which the majority of the Maltese emigrated—introduced tight immigration control, and consequently from 1975 onwards Maltese emigration slumped well below the projected targets.[14]

That the number of computer installations in the 1970s in Malta was miniscule may be gauged from the value of installed computers as percent of Gross National Product (GNP). In 1973, for example, this value was between 1% and 2% for the industrialized nations and considerably less for developing countries, but still above 0.1% for the rest of the world.[15] Throughout the 1970s, Malta's computer installation base was still so small as to be insignificant. In 1980, for example, the estimated value of imported 'data processing' machines, including their peripherals, was Lm255,000 or 0.07% of GNP. By contrast, a decade later, the picture is very different: in 1990, the estimated value of imported computing equipment stood at Lm2,017,000, which works out at 0.3% of GNP.[16]

Referring again to Table 2, this shows how difficult it can be for even well established companies to capture the computer market when that market is small and has already been exploited by another competitor. In Malta, this seems to have been the case with NCR. Although NCR was the number one player in Malta when it came to cash register sales,[17] its sales of computers was certainly unimpressive, their first local computer sale not being secured until 1979. This, in spite of some aggressive marketing such as when the Century series of computers was launched in 1968, when full-page adverts appeared in local newspapers, and no less a key figure than NCR's vice president and Group Executive International Operations, George Haynes, visited Malta to discuss NCR's future.[18] Yet, not one Century model was sold. Of course, it needs to be added that NCR also specialized in office accounting machines and that many organizations were happy to invest in

[14] E. P. Delia, *Papers on Malta's Political Economy*, Malta, 2002, p. 100.

[15] J. W. Cortada, *Information Technology as Business History – Issues in the History and Management of Computers*, Westport, Connecticut, 1996, p. 76.

[16] Figures taken from the *National Abstract of Statistics* for 1980 and 1990, respectively.

[17] One account states that by 1968 NCR machine population (accounting and adding machines and cash registers) [in Malta] exceeded one thousand. 'NCR plans for Malta', *Times of Malta*, 3 April 1968, p. 5.

[18] Ibid.

accounting machines instead of the more expensive and sophisticated computers. For example, in 1960 the Treasury made precisely this choice when it purchased a number of National Class 31/32 Accounting Machines.[19]

Finally, one notes that, beginning from 1980, computer makes other than ICL and NCR start appearing. In fact, from this date onwards, the two leading computer and office accounting firms no longer enjoyed a duopoly, although their sales continued to rise steadily in the 1980s.

Table 3 Population and Gross Domestic Product, 1981

	MALTA	U.K.	(ratio)
Population:	0.32 m.	55.9 m.	(1 : 174)
GDP:	£M347 m.	£211,792 m.	(1 : 469)
Per Capita GDP:	£M1,084	£3,789	(1 : 2.8)[a]

Source: National Statistics Office, Malta; and G. F. Stanlake's *Introductory Economics* (4th Ed.), Harlow, 1983, p. 148.
[a] Based on an exchange rate of £1.26 to £M1.0.

Table 4 Manufacturing establishments by size of employment

Numbers Employed	Number of Firms MALTA (1978)	UK (1979)
fewer than 10	1377	59,783
10 – 49	222	30,302
50 – 99	58	6,683
100 – 499	50[a]	8,284
500 and above	–	2,341
All firms	*1728*	*107,393*

Source: Malta 1978 figures compiled from Table 6 of *Census of Production 1978 – Summary Tables*, COS, 1980, p. 62; UK figures from G. F. Stanlake, *Introductory Economics* (4th Edition), Longman, 1983, p. 87.
[a] It should be noted that this figure (= 50) may include some firms that employed in excess of 499 persons.

The Players Involved: Suppliers and Users

Suppliers

It has been mentioned that the early suppliers were well-established international computer firms or their agents. Apart from Olivetti's local representative, which

[19] Anon., 'Mechanized Accounting at the Treasury', *The Review*, Malta, 6 April 1960, p. 1.

dealt in office equipment, a number of other well-established office equipment companies have operated in Malta since at least the 1960s, representing famous brand names (e.g. Rank Xerox and Burroughs). These agents showed little interest in computing technology, beginning to import computers only when the latter had become desktop machines. In the early 1980s, a few of these companies set up small 'computer divisions' with the aim of providing software support, but it appears that their effort into the personal computer (PC) market did not pay off as well as those companies specifically created for this purpose, although there are no figures to substantiate this.

The Maltese companies listed in Table 1, which were formed specifically to offer computing services, have had a very good track record, overall. What are the likely reasons for their success? Apart from being 'first-movers', two explanations include:

(1) Experienced/knowledgeable company founders. For example,

a) In the case of Megabyte Ltd, the two founding company directors were both highly qualified in computing, one with a Master of Science in computer engineering, the other with another Masters in software engineering. One of their first technicians was also somewhat of a computer guru, especially knowledgeable in electronics and low-level programming.
b) In the case of Management Computer Services, the founders in this case were former Barclays data-processing employees with National Computer Centre (NCC) qualifications.[20]

(2) Partnership/affiliation with an already established overseas company. For example,

a) In the case of Intercomp, the company was affiliated to Computer Design Systems, an Anglo-American systems house based in Manchester and New York. (The founders were also experienced and qualified persons.)
b) In the case of Computime, the company was affiliated to Systime Ltd of UK. (Again, the founders were experienced and qualified persons.)

Users

Undoubtedly, one determining factor for the slow take-up of computers in the period considered is the high purchase price, or rental fee (it was common to rent computers, or computing time, up to the 1970s) of the machines, combined with the very limited size of the local market. The price factor is confirmed by Table 2,

[20] The National Computing Centre is the leading UK corporate IT body set up in 1966. See: http://www.ncc.co.uk.

which reveals that the majority of computer users were either large private companies or the government. Farsons is a large brewery employing hundreds of workers; Foster Clark is another large manufacturing concern, a food producer targeting both the local and export markets; and Gasan is a group of companies dealing in insurance and the importation of automobiles. These companies could justify the high initial expense of installing and running a computer and, equally as important, they could also afford to have their own small data processing team to develop in-house software.

Some major local industry players are nevertheless missing from the list of companies shown in Table 2. These include the banks (apart from Barclays), large insurance agents (Gasan being the exception), and other large manufacturing concerns. It might be revealing to find out if there was a particular reason for this: did they not feel the need for a computer, or were they reluctant to introduce one and, if so, why?

Presenting the Computer

In view of the small number of systems installed before the 1980s and given that the first computer fair was held in 1981, it is pertinent to ask how and how often was the computer presented to the public before 1981 (when the Government Computer Centre at Swatar in Dingli made big news). How frequently, for example, did computer-related articles and adverts appear in the local press? Was the latter instrumental in educating the public? What was the public's perception of computers and how aware was the general public of the computer's use?

While it may be difficult to answer some of these questions – and it is certainly not the aim of this paper to do so—the author has carried out a relatively simple exercise that may perhaps help shed some light on the computer's publicity prior to the 1980s. In 2006, the popular local newspaper *The Times* introduced an electronic archival search service that, in spite of its limited capabilities, enables the researcher to perform tasks that would otherwise be daunting or nearly impossible to carry out without the aid of computing technology. The author therefore tried out this service by, amongst other things, submitting a search for the word 'computer' appearing in this newspaper.[21] Apart from bringing up images of where the term occurs, a count of the frequency of occurrence is also given.

Figure 1 (on p. 95 *infra)* shows the results of this search, a chart of the frequency of the word 'computer', yearly, for the period 1960–1980 (beyond 1980 the rise is roughly exponential). One distinctive and interesting feature is that for a number of years following 1971 there is a drop in the count. This is surprising, since one would have expected this count to continue rising steadily, if not

[21] This service, which is currently suspended, could be accessed at http://archive.timesofmalta.com.

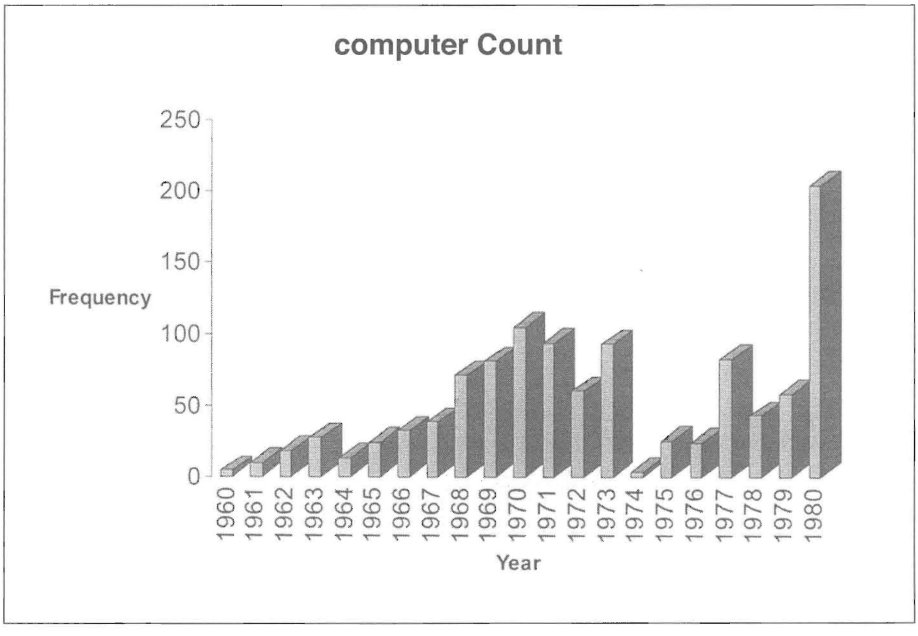

Figure 1. *Count of the word 'computer' appearing in a leading local newspaper, 1960–80.*

exponentially. Whether this is causal or coincidental with certain events that happened around that period (for example, with the change of government in 1971; or with the fact that Malta, like many other countries, was experiencing a recession) will probably be difficult to ascertain.

Interestingly, if the same exercise is repeated for the words 'programming' and 'software', pretty much the same pattern emerges for 'programming', but the results show that the count for the word 'software' remained insignificant until the late 1970s, showing that this term was certainly not as common as the word 'programming', even though the word 'software' was first coined in 1959–1960. The counts for these are shown in Figure 2.

The articles themselves can also be revealing. For example, did they just describe an application, or did they also provide technical information? Although no attempt has been made to go through all the articles, a courtesy look at many of them reveals that these – as one might expect of a daily newspaper – were mainly of the application description type, however a number of articles also dealt with new innovations in technology, major company mergers, and related issues.

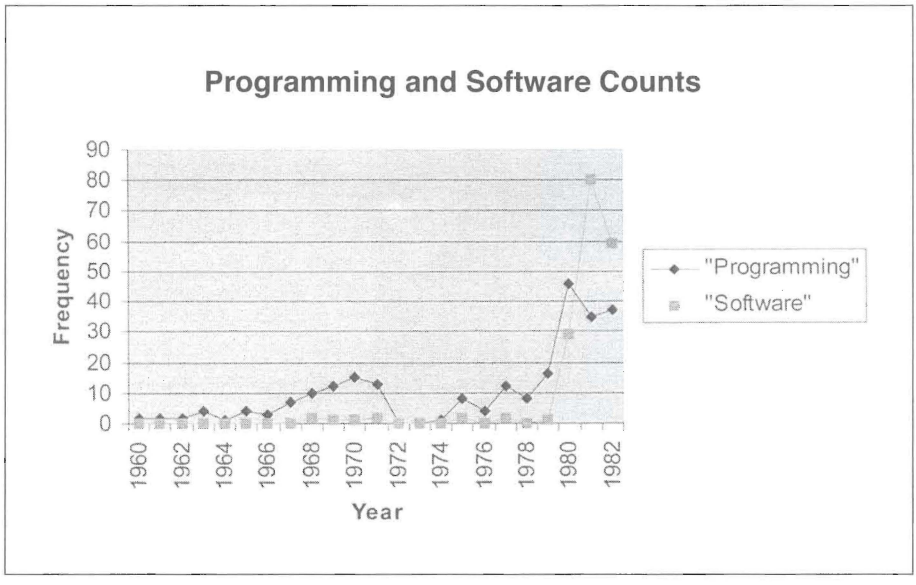

Figure 2. *Count of the word 'programming' and 'software'*

What about computer articles appearing in local business or economics-related publications? The business newspaper *The Malta Economist* for the years 1969–74 carried a number of articles about computers, particularly in the period 1969–71 which, it will be recalled, coincided with the Apollo lunar landing missions. ICL used the Apollo missions (as well as the decimal currency changeover preparations, then a big issue) as the basis of a hefty advertising campaign when it launched a series of adverts, each featuring some new computing theme. Interestingly, and in contrast to previous years, hardly one computer-related article or advert appeared in *The Malta Economist* in 1973 and in 1974 when the publication was halted.

To sum up, it appears that sufficient informative material was presented in the late 1960s and early 1970s to enable any habitual reader of *The Times* and *The Malta Economist* to gain an appreciation of computers. It also appears that the articles appearing in the mid- to late 1970s were fewer, shorter, and of a more general nature.

Explanation for 'take off': the New Modes of Computing

The 'take off' of computers and computing in the early 1980s has much to do with the new modes of computing, including that provided by the microcomputer, as with the fall in hardware cost and the establishment of erudite suppliers without whom users contemplating to computerize would have been at a loss.

Although the success of time-sharing—introduced as a concept in the United States as early as the late 1950s by John McCarthy (and others) and independently in Britain by Christopher Strachey in 1959—is sometimes exaggerated, there is no doubt that it revolutionized the way users perceived the computer.[22] For the first time, users could interact with the computer via their own terminals and appear to have exclusive use of the machine, owning it, as it were. That apart, however, time-sharing meant that a company interested in computerizing its business, or part of it, did not need to invest in expensive computer hardware, which could even become obsolete within just a few years. By having one or two terminals and a printer connected via a telephone line to the supplier's large mainframe computer, a company (the user) could interactively time-share with other users the powerful computer and effectively achieve the same result as if it were the computer's owner. Of course, the typical monthly rental fee for the time-sharing service was not cheap, but for some it was still better than installing a minicomputer, learning how to operate it (possibly employing someone to do so), and probably paying a substantial, yearly maintenance fee. With the introduction in Malta of this type of service—made possible by Computime—in 1980, a number of small-to-medium sized companies began choosing this option.[23]

The second important milestone was the appearance in 1980 of the micro-computer, in Malta introduced by Megabyte, but also shortly afterwards by other firms such as BDS (original agent for the Apple computer) and Economicard (original agent for the PET computer). These 'personal' computers often could be programmed in BASIC, the very same programming language that John Kemeny and Thomas Kurtz developed specifically for their Dartmouth College time-sharing system to allow users to easily interact with the computer. This relatively straight-

[22] Although Strachey—then working for the National Research Development Corporation of London—described his system as 'time-sharing' it only involved a single person 'interacting' with the computer. On the other hand, McCarthy, at the time an assistant professor at MIT, envisaged several users simultaneously sharing the computer system. See Arthur L. Norberg and Judy E. O'Neill, *Transforming Computer Technology: Information Processing for the Pentagon, 1962–1986*, 1996, pp. 68–118 for an interesting and detailed analysis of the early time-sharing years.

[23] In North America, where the feasibility of time-sharing was shown in the mid-1960s by systems such as the Dartmouth Time-sharing System (DTSS) and MIT's Compatible Time-sharing System (CTSS), time-sharing was spoken of as a 'computer utility', likened to the power utility. By 1970 the computer utility was booming, yet in Malta it did not take off until at least a decade later.

forward programmability feature gave these desktop machines their business appeal. What microcomputers did, particularly the more 'top-end' makes that included floppy-disk storage, was to enable the small businessman to change the way he or she would run his or her business. For this, however, expertise in systems analysis and programming on the part of the supplier was an essential ingredient for success (for both supplier and client), since invariably the user knew little, if anything, about computer systems. The user trusted the supplier who frequently would be required to customize, or design from scratch, a system to suit the user's particular business needs.

Summary

This short paper reviewed the state of computing in Malta from the late 1960s up to *c.*1981. In spite of an early attempt to establish a government computer centre by the beginning of the 1970s, and despite the fact that the public seemed to have been generally well informed about the new technology, it was seen that the take up of computers all through the seventies was slow. This is probably partly attributable to the lack of interest in computers by the Labour government taking office in 1971 (and remaining in power for three consecutive terms), the small Maltese market, and the high cost needed to invest in them. In fact, practically all the computer users identified up to 1980 were large organizations. It may be that Malta was also unprepared for the new technology.

Beginning exactly from 1980, a number of private firms – sensing the apparent absence of local computer services – set up computer operations, specializing in time-sharing, minicomputer installations, and tailor-made software. This was no coincidence since in that period time-sharing was still a global booming industry (although on the decline), as was that of minicomputers, microcomputers, and 'turnkey' systems. 'Turnkey' is, in fact, how some of the new Maltese firms advertized their services.

The government of the day also ultimately recognized the importance of computer technology and, in 1981 – coinciding with the first electronics fair in which a number of computers were publicly displayed – opened its computer centre. Within a few years, the number of computer installations rose to an unprecedented high, exceeding the combined number of installations for the previous two decades. Helped by diminishing computer costs and the presence of specialized computer firms, the private sector was now ready to accept the new technology. Computers were here to stay.