Malaysian Journal of Library & Information Science, Vol. 8, no. 1, July 2003: 45-63

AVAILABILITY AND OVERLAP OF QUALITY COMPUTER SCIENCE JOURNAL HOLDINGS IN SELECTED UNIVERSITY LIBRARIES IN MALAYSIA

A.N. Zainab[1] and S.L. Ng[2]
[1]MLIS Programme, Faculty of Computer Science
& Information Technology,University of Malaya, Malaysia
[2]Library, Taylors College, Subang Jaya Malaysia
e-mail: zainab@um.edu.my

ABSTRACT

The study reveals the availability status of quality journals in the field of computer science held in the libraries of the University of Malaya, (UM), University of Science Malaysia (USM), University of Technology Malaysia (UTM), National University of Malaysia (UKM) and University Putra Malaysia (UPM). These universities are selected since they offer degree programmes in computer science. The study also investigates the degree of overlaps and unique titles in the five libraries. The University of Malaya Library was taken as a case study to show how total overlap titles are calculated, and how possible savings and wider coverage of quality journals could be achieved if cooperative acquisition scheme is practiced. Quality journals in the study are 301 titles with calculated impact factor listed by the Journal Citation Report (JCR). The results indicate that (a) the title availability ranges from poor to very poor with 40% by UTM, 34.22% by UM, and 16% by UKM: (b) out of the 301 titles, 115 (38.2%) are overlaps, 96 titles (32.23%) are unique titles and 89 titles are not subscribed; (c) the percentage of unique titles and overlaps are related to the size of title availability; (d) journal titles subscribed increased by more than 50% each year (e) the cost of journal title overlaps for UM library is estimated to be about US$163,170.60. This cost could be reduced and a wider coverage of unique titles could be achieved if the five libraries cooperatively acquire high impact journal titles.

Keywords: Journal duplicates; Journal overlaps, Computer science; Malaysia; Impact factor journals; Collection development.

THE CONTEXT

The Fifth Malaysia Plan covering 1986-1990 (Malaysia, 1986) embodied Malaysia's initial commitment to science and technology (S & T), where the government unveiled her vision of an industrialized nation by the year 2020 and subsequent 5-year plans have included the government's policy on S & T research and development management schemes. Information and

communication (ICT) research featured prominently in the Sixth Malaysia Plan (Malaysia, 1991) where the focus was on "information and communication, high performance computing, networking, communications, digital imaging multimedia, high definition display, high density storage, software and simulation and modeling". Between 1992 and 1998, Malaysia has recorded a steady growth in its national gross expenditure on research and development (GERD) from RM550.7 million (1992) to RM1,127.0 million (1998). However, by international standard this was still low, as spending of at least 1% of the GDP was the acceptable level at which R & D could begin effectively. When the GERD/GDP ratio was compared to the other Asean countries, Malaysia was ahead of Thailand (0.2) and Indonesia (0.16) but behind Singapore (1.76), Taiwan (1.82) and Japan (3.00) (*1998 Malaysian Science*.., 1999, Fig.5.1). In terms of the expenditure on R & D activities based on fields of research, most government research agencies and institutions concentrated on Information, computer and communication technology (40.4%) followed by agricultural sciences (24.9%) and applied sciences (12.2%) (*1998 national survey*.., 1999, p.37). The drastic increase was in the total expenditure in ICT related areas from less than RM5 million in 1996 to about RM100 million in 1998.

Where does the library come into this picture? The supporting role played by libraries in providing resources and materials for R & D information needs is evident. The situation, especially apply to journal collection which form the main channel that researchers use to disseminate and assimilate research findings. Libraries face two main problems in their attempt at providing good journal support for research and teaching. The large volume of journal titles published each year makes it impossible for any library to acquire all but only a fraction of journal titles in any discipline. Also, the subscription prices of journal titles have grown by a few hundred percent over the years (Sen and Mashkuri, 1997). Patterns of library spending indicated that even though the proportion of library budget devoted to the purchase of serials have arisen to as high as 50 percent, yet the average serials holdings has dropped dramatically (Page, Campbell and Meadows, 1997). To handle the situation libraries embarked on journal deselection and cancellation exercise in order to cope with rising costs. Various techniques were used to justify such cause of action such as deselection based on journal use study and journal cost studies (Walter, 1990; Barstow, 1993; Bosch and Simons, 1996; Chrzastowski and Schmidt, 1996). Another strategy was to concentrate on acquiring only quality titles based on journal ranking provided by *Journal Citation Report (JCR)*, published by American Society for Information Science and Technology (Nisonger, 1994, Altmann and Gorman, 1998; Kreider, 1999, Meadows, 2000). Journals listed in the *JCR* are ranked in accordance to their estimated impact factor. A journal's impact factor is an estimate of the number of citations on average, an article published in that journal receives. A journal with a high impact factor indicates that the articles

published in the journal are highly cited. The journals with impact factor counts are therefore regarded as quality journals. The journal impact factor has been used to help libraries decide the optimum coverage of journal collection in a specific field (Buffardi and Nichols, 1981; Meadows, 2000). Another method used was to identify overlap holdings of journal titles among a group of libraries to support the case for journal resource sharing and interlibrary-loans (Knightly, 1975; German, Kidd and Pratt, 1997; Fedunok, 1998).

This paper will focus on identifying the status of the quality journal collection in selected Malaysian University libraries in the field of computer science, estimate the degree of title duplication and overlaps that occur among the libraries and provide some suggestions on how to lessen the impact of rising costs of journal subscriptions.

SCOPE OF THE STUDY

This study aims to find out: (a) the status of availability of ranked journal titles listed in the *JCR* among selected university libraries in the field of computer science; (b) the strength and weaknesses of journal collection in this field; and (c) the cost involved in overlapping journal subscriptions. The focus is on journal subscriptions on the subject of computer science and the university libraries studied are libraries at the University of Malaya (UM), Science University of Malaysia (USM), University of Technology Malaysia (UTM), National University of Malaysia (UKM) and University Putra Malaysia (UPM). These universities offer degree programmes in computer science and have been established for more than 15 years. It is assumed that these university libraries need a strong and quality journal collection in computer science to serve the research information needs in this field. The lists of ranked journal titles used in this study were those listed in the *JCR*. A total of 387 titles in the field of computer science were listed under seven categories: (a) artificial intelligence (62 titles); (b) Cybernetics (16); (c) Hardware and architecture (47); (d) Information systems (59); (e) Interdisciplinary applications (71); (f) Software, graphics, programming (68); and (g) Theory and methods (64). The full list of the titles is given in the appendix. However, a number of titles were listed under more than one category in *JCR* and the final number of unique title used in the study was 301.

The study involved the following stages: (a) identifying the journal titles obtained from the *JCR* list against the holdings of each university library; (b) checking the bibliographic details of each titles against *Ulrich's International Periodicals Directory* for information such as the subscription prices (as given in 1999), frequency, language and full title. Journals on order were not included and the prices calculated were based on those quoted in *Ulrich*. All subscription prices are quoted in US dollars.

The term overlap means two libraries acquiring the same title. Title duplications occur when one library has more than one copy of a title and title replication refers to a situation where more than two libraries own the same title (Hopper, 1990). In this study, the numeral 1 is coded for a library when a title is held. The total of journal titles in each subject category is the availability of journal holdings in each library. It is presented in percentages according to a scale of measurement which ranges from 80% and above as excellent; 60-79 as very good; 45-59 as good; 30-44 as poor and below 30% as very poor.

FINDINGS

Journal Availability According to Institutions

UTM held the highest number of journal titles in the field of computer science, which were listed in the *JCR*, followed by UM, USM, UPM and UKM. Based on the availability scale of measurement used, the holding of high impact factor titles by all university libraries ranged from poor to very poor (Table 1). When the availability factor was analysed according to the seven categories listed in *JCR*, the results indicate that USM held the highest number of AI titles, UM had more titles in the field of information systems and UTM led in cybernetics, hardware and architecture, interdisciplinary applications, software, graphics, programming and theory and methods (Table 2).

Table 1: Journal Availability by Selected University Libraries

Libraries	Title Availability	% of Total Listed in *JCR*	Availability Measurement Scale
UM	103	34.22	Poor
USM	94	31.23	Poor
UPM	70	23.26	Very Poor
UTM	121	40.20	Poor
UKM	50	16.61	Very Poor

Table 2: Journal Availability by Categories Listed in *JCR*

Category	UM	USM	UPM	UTM	UKM
Artificial Intelligence	13	20	13	17	3
Cybernetics	4	1	2	5	1
Hardware and Architecture	23	21	14	24	13
Information System	28	20	17	23	16
Interdisciplinary Applications	22	19	11	32	12
Software, Graphics, Programming	26	31	20	34	11
Theory and Method	21	18	17	27	9

The journal with the highest impact factor in AI and was subscribed by both UM and UPM was *Cognitive Brain Research* (IP-=2.755). Fourteen out of the 62 title in AI (22%) listed in *JCR* were held by more than one library, whilst 24 titles (39%) were not subscribed by any of the libraries. UM held the journal with the highest impact factor in the field of Cybernetics (*Biological Cybernetics* IF=1.089). Four out of the 16 titles listed in *JCR* in this category were held in more than one library and 7 titles were not subscribed. The journal with highest impact factor in the field of Hardware and architecture was *Journal of the ACM* (IF=1.703) and was held by UM, USM, and UTM. Twenty-five out of 47 titles (53%) listed in the *JCR* in this category were held in more than one library and 12 titles were not subscribed. The 71 titles listed in the category of Interdisciplinary applications has impact factor ranging from 4.938 (*Journal of Molecular Graphics & Modeling)* to 0.015 (*International Journal of Computer Applications in Technology*). Twenty-six out of 71 titles listed (37%) in this category in the *JCR* were held in more than one library and 22 titles were not subscribed. The impact factor of journals in the category of information system ranges from 2.609 (*Journal of Chemical Information and Computer Science* and were held both in UM and UKM) to 0.048 (*Data & Knowledge Engineering*) held by UM and USM. Twenty-eight out of the 59 titles (47%) listed in this category were held by more than one library and 16 (27%) were not subscribed. In the field of Software, Graphics and Programming, *Journal of the ACM* again emerged as the title with the highest impact factor and was held by three libraries, UM, USM and UTM. Thirty-two of the 68 titles listed in this category were held by more than one library and only 12 titles (18%) were not subscribed. Lastly, in the field of Theory and Methods the journal with the highest impact factor (*IEEE Parallel & Distributed Technology*, IF=1.727) was held in UM. Twenty-one out of sixty-four titles listed in this category were held by more than one library and 19 titles (29.6%) were not subscribed.

Overlaps /Duplicates of Journal Titles

When the titles listed in the *JCR* was checked against each library's holding, the results revealed that a high percentage of titles were held by more than one library. A total of 115 (38.2%) of the titles overlap among the libraries. Also, 97 titles (32.23%) were unique titles held only in a single library collection. Out of the 301 titles listed 89 titles (29.57%) have not been subscribed (Table 3).

UM and UTM held the highest number of unique titles, which together constituted 60.41% of total titles and out of this number UTM held 38 titles. This finding corroborated other studies that indicated that the higher the percentage of journal availability in a library, the higher the percentage of unique titles (Altman, 1972; German, Kidd and Pratt, 1997). Even in the case of UKM that held a small collection had some unique titles that may be useful in a cooperative acquisition scheme.

Table 3: Total Overlaps/Unsubscribed Journal Titles in Computer Science

Type of Title	Total	% of 301	UM	USM	UPM	UTM	UKM
Unique	97	32.23	20 0.62%	18 18.56%	16 16.49%	38 39.18%	5 5.15%
Overlap	115	38.20	83 24.34%	76 22.29	54 15.84%	83 24.34%	45 13.20%
Not Subscribed	89	29.57	-	-	-	-	-
Total	301	100					

The percentage of title overlaps was much higher compared to unique titles. The results show that the five university libraries in Malaysia held many similar journal titles in Computer Science. UM and UTM have the same number of overlap titles and together they both accounted for 48.5% of total overlaps. Table 4 indicates the overlap of journal titles held at different libraries. When the total titles (212) held at the selected libraries were further analysed (301, total listed minus 89, being the number not subscribed), it was found that 45.7% represent unique titles held at only one library, 21.7% are held by more than one library, 15.5% are held by three libraries. The percentage difference between the unique titles and overlapping titles was small (8.50%).

Table 4: Overlap Journal Titles held at Selected University Libraries

Number of Libraries with Unique Titles	Number of Titles	% of the total
Titles held by 2 libraries	97	45.71
Titles held by 3 libraries	46	21.90
Titles held by 4 libraries	30	14.29
Titles held by 5 libraries	6	2.86
Total	212	100.00

This result is similar to the findings of other studies that showed a high percentage of overlaps occurring between large libraries (Cooper, Thompson and Weeks, 1975; Potter, 1982, 1986). Table 5a and 5b indicate the extent of overlap titles on a library to library basis.

Table 5a presents the absolute number of overlap titles on a library-by-library basis. The numbers in bold and italics represent the total number of journal titles taken by that library. UTM has 83 titles and shares 58 of these titles in common with UM library, 50 titles with USM, 39 titles with UPM and 32 titles with UKM.

Table 5a: Total Journal Title Overlaps by Library

	UTM	UM	USM	UPM	UKM
UTM	***83***	58	50	39	32
UM	58	***83***	57	35	29
USM	50	57	***76***	35	28
UPM	39	35	35	***54***	21
UKM	32	29	28	21	***45***

Table 5b shows the same data that has been converted to percentages. The 50 titles that UKM hold in common with USM represents 60.24% of UTM's *JCR* based journal titles in computer science. The overlap analysis was also carried out for different categories of computer science. Table 6 indicates that overlaps occur most in the category of hardware and architecture, which shows 75.75% title overlaps in two or more libraries.

Table 5b: Percentage Journal Title Overlaps by Library

	UTM	UM	USM	UPM	UKM
UTM		69.88%	60.24%	46.99%	38.55%
UM	69.88%		68.67%	42.17%	34.94%
USM	64.94%	74.03%		45.45%	36.36%
UPM	72.22%	64.82%	64.81%		38.89%
UKM	71.11%	64.44%	62.22%	46.67%	

High overlap of titles was also indicated in the fields of interdisciplinary applications, information systems and software, graphics, programming, where the degree of overlaps was over 60% percentage. Least overlaps occur in the relatively newer fields of artificial intelligence, cybernetics, theory and methods.

The results indicate that the degree of overlap in all categories is higher than the percentages of titles held in one library. There were however, exceptions in the category of cybernetics, artificial intelligence, and theory and methods. The average percentage of overlaps among the seven categories of computer science was 57.4%.

Table 6: Overlaps of Journal Titles by Subject Categories

Categorise	**No. of Titles**	**% of Total**	**Categorise**	**No. of Titles**	**% of Total**
Artificial Intelligence			Information Systems		
In 1 library	22	58	In 1 library	14	34
In 2 libraries	7	18	In 2 libraries	7	17
In 3 libraries	6	16	In 3 libraries	8	20
In 4 libraries	3	8	In 4 libraries	10	24
In 5 libraries	-	-	In 5 libraries	2	5
Total	38	100	Total	41	100
Cybernetics			Software, Graphics, Programming		
In 1 library	6	60	In 1 library	19	37
In 2 libraries	4	40	In 2 libraries	13	25
In 3 libraries	-	-	In 3 libraries	8	15
In 4 libraries	-	-	In 4 libraries	10	19
In 5 libraries	-	-	In 5 libraries	2	4
Total	10	100.00	Total	52	100
Hardware and Architecture			Theory and Methods		
In 1 library	8	24	In 1 library	24	50
In 2 libraries	6	18	In 2 libraries	6	13
In 3 libraries	7	21	In 3 libraries	5	10
In 4 libraries	8	24	In 4 libraries	8	17
In 5 libraries	4	12.	In 5 libraries	5	10
Total	33	99	Total	48	100
Interdisciplinary Applications					
In 1 library	13	33			
In 2 libraries	12	31			
In 3 libraries	9	23			
In 4 libraries	4	10			
In 5 libraries	1	3			
Total	39	100			

The Costs of Overlaps of Journal Titles

Based on the prices quoted in *Ulrich* the cost of subscribing the journal titles held by each library was calculated (Table 7). The cost and percentage increase for journal subscriptions over the previous year were calculated. The percentage of increase among the titles subscribed ranged from 14.6% to 19.6% with an average percentage of 16.9%. In this context the price of journals includes titles in the form of print and electronic.

Table 7: Journal Cost for Each University Libraries

Universities	Titles availability	% of Total	1999 ($ USD)	2000 ($ USD)	Difference ($ USD)	% Increase
UTM	121	40	87,721.67	109,102.70	21,381.03	19.6
UM	103	34	79,378.82	92,948.87	13,570.05	14.6
USM	94	31	67.386.08	79,890.76	12,504.68	15.6
UPM	70	23	47,955.24	57,401.61	9,446.37	16.4
UKM	50	17	40,098.97	49,039.08	8,940.11	18.2
Total	438		322,540.78	388,383.02	65,842.24	

As a case study, the cost of journal title overlaps which occurred in the field of computer science held at the UM library was calculated. The summary of the cost is given in Table 8. The cost of overlap was calculated according to the cost of overlapping in 2, 3, 4 and 5 libraries.

Table 8: Journal Overlapping Costs in UM Library (UML)

Rank	Titles	Impact Factor	Subscrip. Costs (USD)	Rank	Titles	Impact Factor	SubscripCosts (USD)
1	Cognitive Brain Res	2.755	646.00	43	Eur J Inform Syst	0.6	190.00
2	J Chem Inf Comp Sci	2.609	444.00	44	IEEE T Comput Aid D	0.571	525.00
3	IEEE Inform Theor	2.083	470.00	45	Comput Chem Eng	0.54	1,913.00
4	J ACM	1.703	200.00	46	Comput Aided Geom D	0.513	541.00
5	Commun ACM	1.698	114.00	47	IEEE T Knowl Data En	0.513	660.00
6	Artif Intell	1.608	1,895.00	48	ACM Comput Surv	0.484	100.00
7	MIS Quart	1.548	90.00	49	Mach Vision Appl	0.471	276.85
8	Inform Syst	1.547	1,194.00	50	AT & T Tech J	0.438	84.00
9	IEEE T Pattern Anal	1.417	870.00	51	IEEE Comput Graph	0.426	510.00
10	J Comput Phys	1.377	3,674.00	52	Comput Biol Med	0.422	1,081.00
11	IEEE T Image Process	1.364	650.00	53	Comput Geosci	0.412	1,563.00
12	J Am Soc Inform Sci	1.35	1,518.00	54	Software Pract Exper	0.396	1,970.00
13	Comput Phys Commun	1.302	4,269.00	55	Inform Process Manag	0.366	919.00
14	IEEE T Neural Networ	1.28	550.00	56	Int J Intell Syst	0.354	1,771.00
15	IEEE T Fuzzy Syst	1.239	350.00	57	Comput Networks ISDN	0.329	1,328.00
16	IEEE Network	1.159	185.00	58	Bell Labs Tech J	0.317	84.00
17	IEEE T Software Eng	1.153	860.00	59	Networks	0.306	1,238.00
18	ACM T Database Syst	1.125	149.00	60	Math Syst Theory	0.3	339.00
19	Math Program	1.052	415.30	61	Comput Math Appl	0.28	3,010.00
20	ACM T Math Software	1.032	124.00	62	ASLIB Proc	0.263	252.00
21	IEEE Micro	0.992	480.00	63	Int J Parallel Prog	0.255	984.00
22	Int J Mod Phys C	0.962	481.00	64	IEEE T Reliab	0.242	225.00
23	IEEE T Comput	0.958	935.00	65	Comput J	0.239	655.00
24	Siam J Comput	0.958	448.00	66	Eng Appl Artif Intel	0.235	872.00
25	Comput Method Appl M	0.933	5,964.00	67	Sci Comput Program	0.231	867.00
26	IBM J Res Dev	0.93	205.00	68	Kybernetes	0.194	5,368.65
27	Med Biol Eng Comput	0.856	396.00	69	IEEE Comput Appl Pow	0.184	155.00
28	ACM T Progr Lang Sys	0.839	105.00	70	J Syst Software	0.181	1,254.00
29	IEEE Software	0.82	520.00	71	IEE P-Comput Dig T	0.181	822.00
30	IEEE Expert	0.815	480.00	72	J Comput Civil Eng	0.174	205.00
31	IEEE T Parall Distr	0.766	750.00	73	Inform Software Tech	0.167	681.00
32	IEEE T VLSI Syst	0.733	450.00	74	Inform Technol Libr	0.148	60.00
33	Perform Evaluation	0.718	1,225.00	75	Comput Humanities	0.126	192.60
34	IBM Syst J	0.71	90.00	76	Byte	0.125	FREE
35	Scientometrics	0.71	1,157.00	77	Theory Comput Syst	0.116	301.00
36	Computer	0.687	785.00	78	Math Comput Simulat	0.076	2,418.00
37	Int J Hum-Comput St	0.685	1,343.00	79	Datamation	0.079	75.00
38	J Logic Program	0.675	1,047.00	80	Ind Manage Data Syst	0.078	5,224.00
39	Inform Manage	0.674	382.00	81	Robot Cim-Int Manuf	0.068	843.00
40	Microproc Microprog	0.667	997.00	82	Data Knowl Eng	0.048	1,154.00
41	Comput Meth Prog Bio	0.664	1,138.00	83	Future Gener Comp Sy	0.019	661.00
42	J Inform Sci	0.634	233.00	84	**TOTAL ($USD)**		**79.650.40**

The total cost of overlap journal titles for UM library is calculated as $79,650.40. It is taken that if two libraries subscribe the same title, the cost will be doubled to $159,300.80 and the cost will triplicate when overlaps occur with a third library. From the 83 titles held in UM library, 27 titles were held in two libraries, 22 titles were held in three libraries, 28 journal titles overlapped with four libraries and 6 titles were held in five libraries. Therefore, the 27 titles

overlap costs about US$56,541.00. The 22 titles overlap cost each library US$20,876.60, resulting in overlap costs of US$62,629.8. The 28 titles overlaps would cost the four universities US$112,105.20 each. Overall, the cost of overlaps would cost US$163,170.60. This cost could be reduced if the libraries establish a cooperative acquisition programme to overcome the problems of escalating journal prices and to prevent deselection. If each library purchase one title listed in *JCR*, the total sum saved would be about US$79,440.40 or RM301,873.52. This means a saving of cost of about 48.69%. The saved sum can be used to purchase other impact factor titles not subscribed by any of the libraries. The *JCR* list revealed that there were 84 titles not subscribed by the five libraries with the estimated total cost of subscription of US$41,440.32. This indicates that all 84 titles can be subscribed if the five libraries embarked on a cooperative acquisition venture, which would inevitably result in a more complete coverage of high impact journal titles in the field of computer science.

CONCLUSION

The results from this study provide an awareness of the degree of journal availability and overlaps among five university libraries in Malaysia. Generally, the level of journal titles availability in computer science among the selected university libraries collections is not encouraging. Out of 212 titles available, 54.24% (115 titles) are overlap copies. When the measuring score is applied, the total availability of *JCR* listed journals ranges from 16.6% to 40.2% with an average of 29.10%. This falls within the rating score range of poor and very poor. This indicates the poor coverage of high impact factor journals in computer science in Malaysian universities. This situation also imply the poor availability of quality journals to serve researchers in this field and this might deprive researchers with the right exposure to quality work and inevitably the encouragement to communicate in these journals to increase research visibility. The three university libraries with the strongest coverage of quality journals in computer science were UTM, UM and USM.

The study revealed that the degree of journal title overlaps and the percentage of unique titles were dependent upon the size of title availability in each library. The size of overlap titles is found to increase for libraries with high journal availability. Potter (1982, 1986) observed similar findings. The present study also indicate that, the larger the size of a library's journal collection the percentage of its holding of unique titles also increases. Hence, UTM has the largest number of title availability as well as a higher percentage of unique titles. German, Kidd and Pratt (1997) also observed similar pattern of unique titles holdings among four nursing college libraries. The high overlaps and small number of unique titles available may be due to a number of reasons. It reflected the overlap in courses, teaching and research programmes in these universities. Also, most of the overlap journal titles were reasonably priced (below RM2000

compared to the more expensive unique titles subscribed. However, the case study made on UM's journal collection revealed the high cost of overlaps which could have been saved through cooperative acquisition of the quality titles. This would release saved funds for the purchase of other quality journals not subscribed. Moore, Miller and Tolliver (1980) studied overlap of monographs in the University of Wisconsin (UW) libraries, which were involved in a cooperative venture. The study found that even in such a situation, the percentage of overlap was still substantial, where the percentage of overlap increased to 32% for 2 to 3 location codes. However, the study did show that the extent of unique titles were higher then overlaps with an average of 54%. Collection diversity was therefore achieved in such a cooperative venture and it is suspected that similar situations would arise for cooperative serials acquisition.

However, overlaps might not be the main reason why some journals were deselected in libraries. Most libraries strive to achieve higher access for their users and studies have shown that the overlap titles were less expensive and a purposeful decision were made to subscribe to some titles, which also indicate higher use rates (Fjallbrant, 1984; Rutledge and Swindler, 1987; Strubbe, 1989).

This finding is based on the status of journals holdings in the year 2001 when this study was conducted. Since then a number of the libraries have increased their subscription of electronic versions of the journal titles. Even in the subscription of electronic titles revealed overlaps between the libraries. This situation has not helped to reduce or save costs incurred. In the electronic environment, costs can only be reduced in a consortium by cost sharing, with each library subscribing to different electronic journal hosts so that more quality journal coverage can be achieved.

The findings also indicate the unplanned acquisition of journal titles reflected by the small percentage of coverage of high impact factor journal and high overlaps. A consortium could not only steer the way for wider coverage of high impact titles but also allow each library to specialize in the acquisition of journal titles in any field of knowledge. This would help increase the range of titles purchased and the possibility of adding more unique titles. This would help the libraries in overcoming the problem of decreasing subscription power. Even though the budget for serials has been increased over the years there has been a gradual reduction in quality titles subscribed. This has encouraged cooperative ventures in the acquisition of electronic journals by several university libraries. One such example is PERDANA (National digital libraries project), which allows member libraries to negotiate collectively with serials vendor for discounts and the creation of a union list of participating libraries' holdings. This would increase access to a wider range of quality titles.

REFERENCES

1998 National survey of research and development. 1999. Kuala Lumpur: Ministry of Science, Technology and the Environment, Malaysia.

Altman, E. 1972. Implications of the title diversity and collection overlap for interlibrary loan among secondary schools. *Library Quarterly*, Vol.42, no.2:177-194.

Altman, Klaus G. and Gorman, G.E. 1998. The usefulness of impact factors in serial selection: a rank and mean analysis using ecology journals. *Library Acquisition: Practice and Theory*, vol.22, no.2:147-159.

Barstow, Sandra. 1993. Quickly selecting serials for cancellation. *Technical Services Quarterly*, Vol.104: 29-42.

Bosch, Stephen and Simons, Nancy. 1996. Reducing rates of inflation: serials cancellations at the University of Arizona. *Technical Services Quarterly*, Vol.14, no.1: 49-65.

Buffardi, Louis C. and Nichols, Julia. 1985. Citation impact, acceptance rate and APA Journals, *American Psychologist*, Vol.36: 1456.

Chrzastowski, Tina E. and Schmidt, Karen A.1996. Collections at risk: revisiting serials cancellations in academic libraries. *College and Research Libraries*, Vol.57, no.4: 351-364.

Cooper, W.S.; Thompson, D.D. and Weeks, K.R. 1975. The duplication of monograph holdings in the University of California Library System. *Library Quarterly*, Vol.45, no.3: 235-273.

Fedunok, Suzanne. 1998. Proposals for inter-institutional serials cooperation at the SUNY Centres. *College and Research Libraries*, Vol 59, no. 2: 67-77.

Fjallbrant, Nancy. 1984. Rationalization of periodical holdings: a case study at Chalmers University Library. *Journal of Academic Librarianship*, vol.10:77-86.

German, R.N.; Kidd, T. and Pratt, G. 1997. Serials overlap in the Higher education institution libraries in Glasgow. *The New Review of Academic Librarianship*, Vol.3: 115-138.

Hooper, A,S.C. 1990. Overlapping journal subscriptions as a factor in University library cooperation. *South African Journal of Library and Information Science*, Vol.58, no.1: 25-32.

Knightly, J.J. 1975. Library collections and academic curricula: quantitative relationships. *College and Research Libraries*, Vol. 36: 295-301.

Kreider, Janice. 1999. The correlation of local citation data with citation data from Journal Citation Report. *Library Resources & Technical Services*, Vol.43, no.2: 67-77.

Malaysia. 1996. *Fifth Malaysia Plan 19991-1995*. Kuala Lumpur: National Printing Office.

Malaysia. 1991. *Sixth Malaysia Plan 19991-1995.* Kuala Lumpur: National Printing Office.

Meadows, Jack. 2000. Why do we need serials? In: T. Kidd and L. Rees-Jones (ed), *The serials management handbook*. London : Library Association.

Moore, B; Miller, T. and Tolliver, D.L. 1980. Title overlap: a study of duplication at the University of Wisconsin system libraries. *College and Research Libraries,* Vol. 43, no.1: 14-21.

Nisonger, Thomas E. 1994. A methodological issue concerning the use of social sciences Citation Index Journal Citation Reports impact factor data for journal ranking. *Library Acquisition: Practice & Theory,* vol.16, no.4: 447-458.

Page, G. ; Campbell, R. and Meadows, J. 1997. *Journal Publishing*. Cambridge: Cambridge University Press.

Potters, W.G. 1982. Studies of collection overlap: a literature review, *Library Research,* Vol.4, no.1: 3-21.

Potters, W.G. 1986. Collection overlap in the LCS network in Illinois. *Library Quarterly,* Vol. 56, no.2: 119-141.

Rutledge, John and Swindler, Luke. 1987. The selection decision: defining criteria and establishing priorities. *College and Research Libraries*, Vol.48: 123-131.

Sen, B.K. and Mashkuri Yaacob. 1997. The ever widening gap. *University News*, 35(8): 11-14, 18.

Strubbe, Lisa Ann. 1989. Characteristics of serials duplication within an academic research library. *Library & Information Science Research*, Vol.11, no.2: 91-108

Ulrich's International Periodicals Directory.

Walter, Pat L. 1990. Doing the unthinkable: canceling journals at a research library. *Serials Librarian*. Vol.8: 141-153.

APPENDIX : Journal Titles in Computer Science Listed in the *Journal Citation Report (JCR)* Used for this Study and their Availability

Full Titles	Impact Factor	Availability	No of Libraries
ACM Computing Surveys	0.484	x	4
ACM Sigplan Notices	0.145	x	1
ACM Transactions on Computer Systems	0.444	x	1
ACM Transactions on Database Systems	1.125	x	4
ACM Transactions on Graphics	1.069	x	1
ACM Transactions on Information Systems	0.931	x	1
ACM Transactions on Mathematical Software	1.032	x	2
ACM Transactions on Programming Languages and Systems	0.839	x	3
ACTA Informatica	0.468	x	4
Advances in Engineering Software	0.243	x	1
AI Applications	0.275	x	1
AI Communications	0.406	-	-
AI Edam-Artificial Intelligence for Engineering Design Analysis	0.462	-	-
AI Magazine	1.62	-	-
Algorithmica	0.517	x	1
Analog Integrated Circuits and Signal Processing	0.345	-	-
Annals of Mathematics and Artificial Intelligence	0.314	-	-
Annual Review of Information Science and Technology	1.25	x	3
Applicable Algebra in Engineering Communication and Computing	0.187	x	1
Applied Artificial Intelligence	0.133	-	-
Applied Intelligence	0.326	-	-
Artificial Intelligence	1.608	x	2
Artificial Intelligence in Engineering	0.2	x	2
Artificial Intelligence in Medicine	1.015	-	-
Artificial Intelligence Review	0.632	x	1
ASLIB Proceedings	0.28	x	4
AT & T Technical Journal	0.438	x	4
Australian Computer Journal	0.172	-	-
Autonomous Robots	0.533	-	-
Behaviour & Information Technology	0.169	-	-
Bell Labs Technical Journal	0.329	x	4
Bioinformatics	0.0	-	-
Biological Cybernetics	1.089	x	1
Biotechnology Software & Internet Journal	0.071	-	-
BIT	0.623	x	2
Byte	0.126	x	5
Canadian Journal of Electrical and Computer Engineering	0.023	-	-
Chemometrics and Intelligent Laboratory Syst	1.754	x	1
Cognitive Brain Research	2.755	x	2
Communications of the ACM	1.698	x	4
Compel-The International J for Computation and Mathematics..	0.157	x	1
Computational Complexity	0.0	x	1
Computational Intelligence	0.391	-	-
Computational Linguistics	0.273	x	2
Computer	0.687	x	3
Computer Aided Design	0.854	x	3
Computer Applications in the Biosciences	2.898	x	1
Computer Communications	0.167	x	2
Computer design	0.022	x	3
Computer Graphics Forum	0.112	-	-
Computer Graphics World	0.036	x	2

Computer Integrated Manufacturing Systems	0.267	x	1
Computer Journal	0.242	x	4
Computer Languages	0.16	x	2
Computer Methods and Programming in Biomedicine	0.664	x	2
Computer Methods in Applied Mechanics and Engineering	0.933	x	4
Computer Music Journal	0.455	x	2
Computer Networks and ISDN Systems	0.352	x	4
Computer Physics Communications	1.302	x	3
Computer Speech and language	0.467	-	-
Computer Standards & Interfaces	0.157	x	1
Computer Systems Science and Engineering	0.091	-	-
Computer Vision and Image Understanding	0.753	x	1
Computers and Artificial Intelligence	0.484	x	1
Computers and Biomedical Research	0.836	-	-
Computers and Chemical Engineering	0.54	x	3
Computers and Chemistry	1.566	x	3
Computers and Education	0.402	x	3
Computers and Electrical Engineering	0.085	x	1
Computers and Electronics in Agriculture	0.347	x	1
Computers and Fluids	0.5	x	2
Computers and Geosciences	0.412	x	2
Computers and Geotechnics	0.134	-	-
Computers and Graphics	0.42	-	-
Computers and Industrial Engineering	0.105	x	1
Computers and Mathematics with Applications	0.3	x	2
Computers and Operational Research	0.246	x	1
Computers and Security	0.128	x	1
Computers and Structures	0.166	x	3
Computers and the Humanities	0.148	x	3
Computers in Biology and Medicine	0.422	x	2
Computers in Industry	0.239	x	1
Computing	0.543	x	3
Computing Systems	0.312	-	-
Concurrency Practice and Experience	0.308	-	-
Cybernetics and System Analysis	0.005	-	-
Cybernetics and Systems	0.378	-	-
\Database for Advances in Information Systems	0.128	-	-
Data and Knowledge Engineering	0.048	x	2
Data Mining and Knowledge Discovery	1.235	-	-
Datamation	0.079	x	5
Decision Support Systems	0..227	x	1
Discrete and Computational Geometry	0.475	x	1
Displays	0.375	-	-
Distributed Computing	0.522	x	1
Distributed and Parallel Databases	0.231	-	-
DR Dobbs Journal	0.097	x	1
Engineering Applications of Artificial Intelligence	0.239	x	3
Engineering with Computers	0.568	x	1
Engineering Computations	0.195	x	2
Engineering Intelligent Systems for Electrical Engineering and Comm	0.0	-	-
Environmental Modeling and Software	0.176	x	1
Environmental Software	0.235	x	1
European Journal of Information Systems	0.6	x	2
Expert Systems	0.039	-	-
Expert Systems with Applications	0.182	x	1
Formal Methods in System Design	0.667	-	-
Future Generation Computer System	0.019	x	2

Fuzzy Sets and Systems	0.331	x	1
Graphical Models and Image Processing	0.674	x	2
Hewlett Packard Journal	0.038	x	2
Human computer Interaction	0.76	-	-
IBM Journal of Research and Development	0.93	x	3
IBM Systems Journal	0.71	x	4
ICCA Journal	0.395	-	-
IEE Proceedings –Computers and Digital Techniques	0/181	x	4
IEEE ACM Transactions on Networking	1.264	x	1
IEEE Computer Applications in Power	0.194	x	3
IEEE Computer Graphics and Applications	0.426	x	4
IEEE Computational Science and Engineering	0.414	x	1
IEEE Concurrency	0.56	-	-
IEEE Design and Test of Computers	0.299	x	1
IEEE Intelligent Systems and their Applications	0.815	x	3
IEEE Micro	0.992	x	4
IEEE Multimedia	0.95	x	1
IEEE Network	1.159	x	3
IEEE Parallel and Distributed Technology	1.727	x	1
IEEE Software	0.82	x	3
IEEE Transactions on Computers	0.958	x	4
IEEE Transactions on Computer Aided Design of Integrated Circuits and Systems	0.571	x	5
IEEE Transactions on Fuzzy Systems	1.239	x	2
IEEE Transactions on Image Processing	1.364	x	4
IEEE Transactions on Information and Systems	0.016	-	-
IEEE Transactions on Information Theory	2.083	x	4
IEEE Transactions on Knowledge and Data Engineering	0.513	x	3
IEEE Transactions on Neural Networks	1.28	x	4
IEEE Transactions on Parallel and Distributed Systems	0.766	x	4
IEEE Transactions on Pattern Analysis and Machine Intelligence	1.417	x	4
IEEE Transactions on Reliability	0.255	x	3
IEEE Transactions on Software Engineering	1.153	x	4
IEEE Transactions on Systems Management and Cybernetics A	0.494	-	-
IEEE Transactions on Systems Management and Cybernetics B	0.866	x	1
IEEE Transactions on Visualization and Computer Graphics	0.759	x	1
IEEE Transactions on Very Large Scale Integrated Systems	0.733	x	2
IEEE Transactions on Fundamentals of Electronics, Communications and Computing	0.207	-	-
Image and Vision Computing	0.431	x	1
Industrial Management and Data Systems	0.078	x	4
Information	0.293	-	-
Information and Computation	0.731	x	1
Information and Management	0.674	x	5
Information Processing Letters	0.196	x	2
Information Processing and Management	0.366	x	3
Information Science	0.169	x	1
Information and Software Technology	0.174	x	4
Information Systems	1.547	x	3
Information Systems Management	0.134	x	1
Information Technology and Libraries	0.167	x	5
International Journal of Approximate Reasoning	0.578	-	-
International Journal of Bio-Medical Computing	0.403	x	1
International Journal of Computer Integrated Manufacturing	0.434	-	-
International Journal of Computer Applications in Technology	0.015	-	-
International Journal of Computational Geometry and Applications	0.27	x	1
International Journal of Computer Vision	1.294	-	-

International Journal of Cooperative Information Systems	0.5	-	-
International Journal of Expert Systems	0.154	x	2
International Journal of General Systems	0.175	x	1
International Journal of High Performance Computing Applications	0.0	-	-
International Journal of High Speed Computing	0.154	x	1
International Journal of Human Computer Interaction	0.267	-	-
International Journal of Human Computer Studies	0.685	x	2
International Journal of Intelligent Systems	0.354	x	3
International Journal of Medical Informatics	0.375	x	1
International Journal of Micrographics & Optical Technology	0.026	-	-
International Journal of Microwave and Millimeter Wave Computer Aided Design	0.321	-	-
International Journal of Modern Physics C	0.962	x	2
International Journal of Numerical Methods in Fluids	0.518	x	1
International Journal of Parrallel Programming	0.263	x	2
International Journal of Pattern Recognition and Artificial Intelligence	0.348	x	3
International Journal of Software Engineering and Knowledge Engineering	0.096	x	2
International Journal of Supercomputer Applications and High Speed Performance	0.659	-	-
International Journal of Systems Science	0.303	x	3
International Journal of Uncertainty Fuzziness and Knowledge Based Systems	0.20	-	-
Integrated Computer Aided Engineering	0.209	-	-
Integration- The VLSI Journal	0.277	-	-
Interacting with Computers	0.688	-	-
Internet Research-Electronic Networking Applications and Theory	0.646	x	1
Journal of the ACM	1.703	x	3
Journal of Algorithms	0.631	-	-
Journal of the American Medical Informatics Association	2.462	-	-
Journal of the American Society for Information Science	1.35	x	4
Journal of Artificial Intelligence Research	1.191	-	-
Journal of Automated Reasoning	0.317	-	-
Journal of Chemical Information and Computer Sciences	2.609	x	2
Journal of Circuit Systems and Computers	0.105	x	1
Journal of Combinatorial Optimization	0.267	-	-
Journal of Computer Aided Molecular Design	2.612	-	-
Journal of Computing in Civil Engineering	0.181	x	4
Journal of Computer Information Systems	0.05	-	-
Journal of Computational Physics	1.377	x	3
Journal of Computer and Systems Sciences International	0.0	x	1
Journal of Computer and System Sciences	0.577	x	3
Journal of Cryptology	0.3	x	1
Journal of Experimental & Theoretical Artificial Intelligence	0.2	-	-
Journal of High Speed Networks	0.302	x	1
Journal of Information Science	0.634	x	3
Journal of Information Technology	0.442	x	3
Journal of Intelligent and Fuzzy systems	0.208	x	1
Journal of Intelligent Manufacturing	0.226	-	-
Journal of Intelligent & Robotic Systems	0.104	x	1
Journal of Logic and Computation	0.394	-	-
Journal of Logic Programming	0.675	x	2
Journal of Mathematical Imaging and Vision	0.543	-	-
Journal of Molecular Graphics & Modeling	4.938	x	1
Journal of Molecular Modeling	0.809	x	1
Journal of Network and Computer Applications	0.137	x	1
Journal of New Music Research	0.2	-	-

Journal of Object Oriented Programming	0.115	-	-
Journal of Parallel Distributed Computing	0.576	-	-
Journal of Programming Languages	0.2	x	1
Journal of Software Maintenance –Research and Practise	0.711	x	1
Journal of Strategic Information Systems	0.069	x	2
Journal of Supercomputing	0.441	-	-
Journal of Symbolic Computation	0.539	x	1
Journal of Systems Architecture	0.029	x	1
Journal of Systems and Software	0.184	x	2
Journal of Visual Communication and Image Representation	0.635	-	-
Journal of Visualization and Computer Animation	0.414	x	1
Journal of Visual Languages and Computing	0.545	-	-
Journal of VLSI Signal Processing Systems for Signal Image and Video Technology	0.466	-	-
Knowledge Engineering Review	1.27	x	1
Knowledge Based Systems	0.159	x	1
Kybernetics	0.231	x	2
Kybernetika	0.08	-	-
Library Software Review	0.375	x	2
M D Computing	1.033	-	-
Machine Learning	1.0	x	1
Machine Vision and Applications	0.471	x	2
Mapletech	0.149	x	1
Match Communications in Mathematical and in Computer Chemistry	0.319	-	-
Mathematical and Computer Modeling	0.251	x	2
Mathematics and Computers in Simulation	0.116	x	2
Mathematical Programming	1.052	x	4
Mathematical Systems Theory	0.306	x	2
Mechatronics	0.292	-	-
Medical and Biological Engineering and Computing	0.856	x	2
Medical Informatics	1.614	x	1
Methods of Information in Medicine	0.651	x	1
Microprocessing and Microprogramming	0.667	x	2
Microprocessors and Microsystems	0.08	x	4
Minds and Machines	0.094	x	1
MIS Quarterly	1.548	x	4
Modeling Identification and Control	0.094	x	1
Multidimensional Systems and Signal Processing	0.135	-	-
Multimedia Tools and Applications	0.268	x	1
Multimedia Systems	0.767	x	1
Network-Computation in Neural Systems	1.333	x	1
Networks	0.317	x	2
Neural Computation	2.071	x	1
Neural Computing and Applications	0.261	-	-
Neural Networks	1.017	x	1
Neural Processing Letters	0.286	x	1
Neurocomputing	0.453	-	-
New Generation Computing	0.188	x	1
Object Oriented Systems	0.667	x	1
Online and CDRom Review	0.311	x	1
Proceeding of the ASSIS Annual Meeting	0.014	-	-
Parallel Computing	0.493	x	1
Pattern Recognition	1.118	x	1
Pattern Recognition Letters	0.344	x	1
Performance Evaluation	0.718	x	5
Presence Teleoperators and Virtual Environments	0.841	x	1
Programming and Computer Software	0.0	x	1

Prpgramming Electronic Library and Information Systems	0.438	-	-
Queuing Systems	0.444	-	-
Rairo-Informatique Theoreque et Applications	0.17	-	-
Random Structures and Algorithms	0.464	-	-
-Real Time Imaging	0.452	x	1
Real Time Systems	0.578	-	-
Robotics and Computer Integrated Manufacturing	0.068	x	3
Science and Computer Programming	0.235	x	2
Scientometrics	0.71	x	4
Siam Journal on Computing	0.958	x	3
Simulation	0.221	x	1
Social Science and Computer Review	0.324	x	1
Software Practice and Experience	0.396	x	4
Software Quality Journal	0.1	x	1
Software: Concepts and Tools	0.452	x	1
Speech Communication	0.442	x	1
Statistics and Computing	0.667	x	1
Structural Optimization	0.031	-	-
Supercomputer	0.154	x	2
Transactions of the Society for Computer Simulation International	0.294	-	-
Theoretical Computer Science	0.349	x	1
Theory of Computing Systems	0.125	x	2
User Modeling and User adapted Interaction	0.571	x	1
Visual Computer	0.382	x	1
VLSI Design	0.038	x	1
Wirtschaftsinformatik	0.148	x	3