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Cost Saving Innovations In Canadian Local Governments: A More In-Depth Look

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Cost Saving Innovations In Canadian Local Governments:

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I. INTRODUCTION

This report is Phase II of a three-phase proposal originally submitted to the Federal Government to study cost saving innovations in local government. Our first mandate, outlined in the terms of reference which now guide this study, was to document efforts at the local level to save money through the use of innovative management and/or technological changes. This particular portion of our mandate was recently completed with the publication of our Phase I report entitled Cost Saving Innovations in Canadian Local Governments (August 1979).

Innovation, particularly within the context of "Cost Saving Innovations in Canadian Local Governments", is not the easiest of terms to define. One definition says that an innovation is simply a new way of combining input so as to achieve a greater level of output for the same aggregate level of input.

However, for the purposes of our study, an innovation will be any idea, concept or technology which has not been widely adopted by local governments and produces a cost saving while not producing a corresponding reduction in the level of service.

Innovations generally fall into three broad categories. They can be either technological innovations, managerial innovations, or client-oriented innovations. Technological innovations involve a new process utilizing a specific machine, material, chemical or analytic routine. Managerial innovations, on the other hand, usually deal with specific administrative policies or practices that adjust the government infrastructure or a particular operating procedure. And finally client-oriented innovations are an attempt to better understand and meet the needs of citizens. Citizen participation in local government is the underlying issue of this type of innovation.

The types of innovations that have typically occurred in the past at the local level of government have been incremental by nature. That is, change in a particular department occurs over a long period of time with a number of small innovations taking place quite separately but having the overall effect of improving the method of operation. This contrasts sharply with the kind of

innovation that is being called for now as local governments have an increasingly difficult time balancing their budgets. A sense of urgency surrounds this problem and many jurisdictions have ruled out the acceptability of continuing the incremental approach.

The seriousness of the problem facing most municipalities now dictates that changes occur much faster than in the past and on a larger scale. There appears to be a general perception that local government spending is so far out of control that only this kind of sweeping action will reverse the trend.

One of the major purposes of Phase II is to determine the factors which are consistently present and necessary to the successful implementation of a cost saving innovation. Within this overall context there are a number of specific objectives which closely correspond to the common steps in the scientific review process. The factors to be examined are:

1) Identification of factors leading to recognition and definition of the problem;
2) Identification of factors underlying impetus for change;
3) Identification of factors leading to a solution of the problem;
4) Identification of factors leading to successful (or unsuccessful) implementation of the change;
5) Identification of the perceived and actual success of the change.

Selection of case studies was very important and it was necessary to satisfy certain criteria. It was important because of the national scope of the project that we consider innovations in different parts of the country. It was also important to ensure that the topic areas to be studied were different from one another to ensure minimum duplication and optimum input regarding innovative efforts in various municipal operations. It was equally important that the case studies selected have sufficient information and documentation available to allow for meaningful examination. Finally, and most importantly, it was necessary to obtain the cooperation of the local officials involved in these innovations.

After selecting the case studies, there were a number of other concerns related to the pursuit of our specific objectives. We felt it would be valuable to

document as thoroughly as possible the decision-making process from the time that the innovation was originally conceived to the actual implementation. Such an examination could provide insight into the inner workings of the municipal decision-making process and allow us to develop a check list of do's and don't's to help guide future efforts by other municipalities.

Of equal importance was the actual implementation procedure. Change is always difficult, and this is especially true at the municipal level where there is concern for political ramifications, for elected persons, relationships with civic employees, as well as the opinions of the general public. Once again, by documenting the implementation procedures, we can provide some shortcuts and suggestions for consideration by municipal officials opting to initiate similar projects.

Perhaps the most difficult of all our objectives is the determination of whether these cost saving innovations actually saved the amount of money claimed by those municipal officials involved. An important factor here is whether services were negatively affected or costs merely transferred to some other department or other level of government. In other words, our evaluation will attempt to substantiate the true cost benefit of each of the innovations studied.

Accordingly, with the above criteria in mind, we have selected the following five innovations for examination as case studies:

1) the bridge crane inspection truck in Metro Toronto;
2) reduction of staff and fire stations in the Quebec City Fire Department;
3) the one-armed mechanical waste collection vehicle in Windsor, Ontario;
4) the central computerized building monitoring system in Winnipeg, Manitoba;
5) the computerized communication system for surface transit vehicles in Metro Toronto.

We have seen from our previous research on cost saving innovations that many municipalities in Canada have been dabbling with technological and productivity improvements. Dabbling would appear to be an accurate description since few

municipalities have really incorporated the innovative concept, although some are moving in that direction. Our case studies prove the lack of sophistication in efforts to date but offer evidence that will be helpful in convincing other local governments to move faster in bringing new cost saving ideas on stream.

Evidence from local governments outside Canada would suggest that we should be very careful as we proceed in our so-called institutionalization of innovation. Certainly, the fear of job dislocation on the part of employees stands as one of the most serious blocks in efforts to change procedures in the name of efficiency and/or effectiveness. Therefore, care must be taken in planning these efforts and employees must be made to feel involved in the entire process. The importance of the employee-related approach can be seen in the careful wording of most official efforts in this area. Committees are not merely called productivity committees, but also include quality of working life as a key phrase. There are several municipal observers who suggest that cost saving innovations only produce temporary savings and that sustained improvement in municipal cost effectiveness can only be achieved through long range programs of improvement in the work environment.

Our case studies were the best available examples of innovations across the country in different areas of municipal operation. However, several studies conducted in the United States, as well as documented experience from certain Canadian cities, can provide valuable insight into the prospects of employee participation. An overview of some of this experience is presented in our report to supplement the material gained from our case studies.

We found that the data base for the municipal sector was very poor and left much to be desired. If there is ever going to be any improvement in the individual evaluation efforts by municipalities, there must be a realization of the need to set up accurate information systems. And if senior levels of governments are going to develop an ability to compare accurately municipal performance from one municipality to another, some system of common data collection must be developed.

II. CASE STUDY: BRIDGE CRANE TRUCK IN METROPOLITAN TORONTO

Introduction

This innovation was selected as a case study because it is a fairly unique technological breakthrough in the area of bridge inspection and repair. Many municipalities have been able to accomplish considerable cost savings through the application of the newly designed equipment and hardware. Many such improvements are fairly minor in terms of their cost saving, such as improved fire hose nozzles or breakaway light standards, but this particular innovation seems to offer the potential for significant cost savings. Very simply, the bridge crane truck is a heavy duty flat bed truck with a hydraulic arm mounted on the back. The hydraulic arm has vertical and horizontal movement capabilities and counter balancing which allows it to reach the underside of most high level bridges.

Background

In Metropolitan Toronto there are approximately 30 bridges which are more than 100 feet above the ground at their highest point. Inspection and repair of these structures in the past involved the expensive and time consuming construction of scaffolding. This approach allowed for limited inspection and repair as scaffolding might only reach a small portion of the bridge undersurface.

A few district road superintendents in the early 1970's had expressed concern about their inability to properly service Metro's deteriorating high level bridges. It was in 1973 that one of the senior department officials read in a technical journal about the development of a new bridge repair and inspection truck that had been developed in the United States. An official inquiry to the manufacturer of the truck, Paxton-Mitchell, in Omaha, Nebraska, was initiated in May of that year. Metro received literature the following month and a letter from the company's local representative -- Equipment Components Limited in Mississauga.

A Review Of Bridge Crane Truck Acquisition And Use

In addition to receiving literature about the newly developed bridge crane truck, the local supplier forwarded an 8 mm film which showed the truck in operation. On receiving this material, the Chief Maintenance Engineer for Metro asked the Senior District Superintendent to arrange a trip to the States for an on-site inspection of the vehicle. Such an inspection was made and on September 28, 1973 the Commissioner of Roads and Traffic officially recommended to Council that the bridge crane truck be purchased from the equipment reserve fund for a total price of $62,000. The purchase order was issued in January 1974 and delivery was made in May of that same year. There was, therefore, approximately one year from the initial identification of the need for this innovation to the eventual delivery.

Although the bridge crane truck has the unique capability of access to the underside of bridges, it is often utilized as a boom or cherry picker, which means that it merely uses its vertical capability to reach the underside of a bridge or roadway from the ground. Estimates by four department employees interviewed placed the use of this truck as a cherry picker at approximately 70% of total utilization. Total utilization has been averaging about 80% of total time available because the truck cannot be used in inclement weather.

Metro Toronto has not prepared any cost benefit analysis for this piece of equipment. There is a general concensus that the truck saves a considerable amount of time which would ordinarily be spent building and taking down scaffolding. One of the district superintendents estimates that it would take four men one and one-half days to build the scaffold needed for a 60 foot bridge; one day to do the work and another day and one-half to take down the scaffolding. This represents approximately 16 man-days. The same job could be completed in less than one day with four men with the use of the bridge crane truck -- for a total of 4 man-days. This is, indeed, a considerable saving.

savings?

Utilizing the information which is available, we can obtain a rough estimate of the money saved in bridge repair alone during the past five years. The truck has been used 5,385 hours since the time of its purchase. Using the 30% figure for the time that it is used for bridge inspection and repair, this would give us a total of 230 days that the truck has been utilized for this purpose during the past five years. With four men assigned to the truck this would mean that 920 man-days have been spent in bridge repair and inspection, whereas under the old system this would have totalled 3,680 man-days. Using an average of $50 per day per man the old system of building scaffolding would have required $184,000, whereas the new system would require only $46,000 -- a savings of $138,000.

	# of man-days	cost per man-day	total cost
Prior to bridge crane truck	3,680	$50	$184,000
After bridge crane truck	920	$50	$ 46,000
Total saving			$138,000

There are many other factors to be taken into consideration, such as the amount of money that has been spent on the maintenance of the truck. This has totalled $7,095 over the past five year period. Also, by doubling as a cherry picker, another truck of this type did not have to be purchased. This may have saved Metro an additional $50,000. There is also the high probability of minor injury which was commonplace during the construction of scaffolding. The lost man-hours and delays were obviously costly to Metro; however, we cannot begin to put a price tag on this factor. There has only been one injury experienced in the five years with the bridge crane truck. This was, again, a very minor injury to the operator's thumb.

The major benefit accruing due to the use of this truck, according to department personnel interviewed, is in two areas. One, bridge repair and inspection has been greatly improved. Two, personnel who used to spend excessive time on bridge repair and inspection are now free for many other jobs which might not have been completed and would have cost Metro a considerable amount of money to complete.

Through the interviews that were held and personal observations of the truck in use, the following comments can be made about the utilization of this unit:

1) Bridge inspections are still primarily done from the ground with binoculars, the bridge crane truck only being utilized when trouble spots are

identified. Many bridges have underside steel framing which allows inspectors a close-up view of the bridge. However, a systematic yearly inspection using the truck would appear to be in order.

2) Each road crew should be given a training course in the proper use and set-up of the bridge crane truck. It might take an hour for just the operator to set up the equipment, whereas with the assistance of the other employees this could be accomplished in 20 minutes.

3) Currently there is little effort to apprise the City of Toronto, the City of North York, and the four boroughs of the availability of this unit. In order to save the expense of building a scaffolding, it is felt that these lower tier municipalities would be willing to pay a rental fee for the use of such a bridge crane truck. This fee could possibly offset the cost to Metro of purchasing or renting an additional cherry picker.

4) The employees interviewed offered suggestions for improvements in the equipment. Currently, waist type safety belts are utilized and it was suggested that a parachute type harness would be much safer. Also, the truck has an expensive and sophisticated transmission system which is deemed to be not necessary due to the low mileage put on the truck each year. It was also recommended that a diesel engine replace the existing gas combustion engine because the truck experiences difficulty in returning to the garage after it has been idling all day.

Conclusions And Final Remarks

The bridge crane truck has obviously been a welcome addition to the heavy equipment complement of Metropolitan Toronto. Considerable time and money is saved because of this unit. Also, as was pointed out earlier, the truck could be more fully utilized for bridge inspection and repair not only for Metro bridges, but also for bridges for the cities and boroughs within Metro, not under Metro jurisdiction. And while very few municipalities across Canada could actually afford to purchase such a vehicle for their own exclusive use, there would appear to be substantial potential for joint purchase arrangements by a number of municipalities in a given area. The bridge crane truck is truly a technological breakthrough worthy of serious consideration.

III. CASE STUDY: FIRE STATION AND PERSONNEL REDUCTION PROGRAM IN QUEBEC CITY, QUEBEC

Introduction

In 1966 the Fire Chief in Quebec City submitted a request to the City Manager and Council for 32 additional fire fighters. The City Council responded to this and other departmental requests by announcing their intention to hire a consulting firm to conduct a complete study of city operations. As a result of the report prepared by P.S. Ross Associates, the Council found that a reduction of 69 fire fighters was actually in order. From that time until now the City has been systematically reducing its fire force and closing fire stations while apparently maintaining an acceptable level of service. We say apparently because there are many extenuating circumstances in Quebec City that prevent a precise examination of the effect these reductions have had on the City's fire fighting capability. We will discuss each of these as we attempt to document and explain the process used in Quebec City to reduce fire department expenditures.

Background to the Fire Department Reduction Programme

The management consultants report based its findings primarily on the proximity of certain stations and the low number of calls to which certain stations responded during the year. The stations, they argued, were built in the horse and buggy days and bore little relationship to actual fire protection needs now evident in this urban community. Also while some stations had as many as two to three calls per day, others were called out as seldom as once every other day. This report proved valuable to the City Manager and Council as they discussed the manning situation with fire department personnel. Equally important, however, was the fact that Quebec City had the dubious distinction of being consistently in the highest quartile of cities its size, in both fire expenditures per capita and fire fighters per capita. This information was drawn from reports on comparative fire department data compiled by the International City Management Association and presented in their annual yearbook. These facts made it very difficult for the fire department to resist demands for a reduction in personnel and apparently the fire chief has become one of the more outspoken exponents of this on-going reduction in staff.

A Review of the Fire Department Reduction Program

In 1967 Quebec City had 542 fire fighters and supporting staff compared to 414 staff in 1979. This reduction of 128 is almost twice the figure of 69 that was originally recommended by the management consultants and the City indicates that even more cuts are planned. There were 13 stations in 1967 and only 10 in 1979 with one more proposed to be closed in the near future. Despite these significant reductions in stations and personnel, the City still lies well above the national average of fire fighters per capita and fire expenditures per capita. As a result, the City Manager, Fire Chief, and Council feel that some work on reductions remains to be accomplished.

The Politics And People Involved

Quebec City is unique in at least two respects when compared to other North American cities. The City has been dominated politically by one party for several years and this has been total rather than just majority domination. As a result there have been very few arguments or debates over public policy (at least not public debates). The changes in the fire department have never been challenged, on the record, by any member of council.

people uninterested

The second unique factor operating in this City involved the extremely low level of citizen participation in local government affairs. Without exception, no one can recall any citizen complaints involving the closing of fire stations or the reduction of fire personnel. Where such closures or reductions have been proposed in other Canadian or American cities there is usually a spontaneous rejection of the proposal by the citizens to be affected as well as a prolonged debate by city council members. Fire fighting has always been one of those sacrosanct municipal services that has been strangely exempt from the cuts and reductions that are forced on other departments.

As a final note on this unique political climate, Quebec City must also have a very quiet and disinterested press since none of these changes has brought about much editorial comment. But then, perhaps all of this so-called apathy may in fact reflect a high level of respect and confidence in the City government by the citizens they serve. All that can be said is that it is a unique situation and offers little insight into the tough decision making process evident in most Canadian cities.

Measuring the Level of Fire Protection

There are several methods utilized when measuring the effectiveness and/or efficiency of a fire department. Most often these performance measures use statistics on loss of lives and property as well as average response time. Loss of lives or property certainly can provide an indication of the level of service being provided but with so many variables affecting such data it is perhaps best to depend on response time as the major determinant of service level.

A quick look at figures on loss of lives reveals that 88 people died in fires between 1967 and 1978 with no discernible upturn associated with the closing of any stations. In fact there were five lives lost in 1967, the first full year of the reduction program, and only three lives lost in 1978. Loss of property also showed no noticeable trend upwards as a result of the reduction program. The ten year period prior to the 1966 consultants report saw a low of $1.4 million in property loss and a high of $5.1 million. The period 1967 to 1978 saw a range of $.9 million to $7.9 million with most increases attributed to the increased value of property. Also the City undertook a sizeable annexation of property in 1970 which did not affect their population to any great extent, but did add 24.1 sq. miles to their total area (population actually decreased from 185,000 in 1967 to 176,196 in 1978).

The more accurate measure of fire department performance response time has not been consistently tabulated during the life of the reduction program. The City utilized a tape response system prior to 1972 that merely recorded the time of the alarm. Data concerning arrival time and the actual time spent fighting the fire have been collected during the past seven years but very little evaluation of the information has occurred. In 1975 there was an analysis undertaken which revealed an average response time for the City between three to four minutes for the ten stations in operation. The range was from two minutes and 40 seconds to approximately eight minutes. The lower response times were all recorded in the original 11.4 sq. mile area of the City while the higher response times were recorded in the annexed area. Such a fluctuation would normally not be acceptable except that the annexed area was previously served by volunteer fire service and it was felt that even a low level of full time service was a welcomed improvement.

Although the loss of lives and property revealed no change after the reduction program was initiated and response times cannot be accurately compared, this does not mean that an effort has not been made to measure the effect of at least the station closing. The City conducted a number of experiments during the closing of various stations. Usually these consisted of time trials or races between the station proposed to be closed and the station responsible for the service area once the station is closed. Without exception the stations with the new assignment were able to have trucks arrive at the scene of a supposed fire before the trucks from the station to be closed. This was enough evidence for the City's decision makers to justify the closing.

Having answered concerns about response time the only remaining question would be the manpower available at each fire. Once again, through a series of measures including the use of mini pumpers, the City was able to place as many men at the scene of fires after staff reductions as they had prior to that time.

This combining of innovations appears to be the real answer to why the City has been able to reduce staff drastically while still maintaining an acceptable level of service.

Special Considerations: The Combined Innovation Approach

Quebec City probably would have found it difficult to accomplish the dramatic reduction of fire personnel and stations had it not been for a number of improvements in various aspects of their overall fire defenses. These innovations have occurred at various times during the past eleven years and some are still in the development stage, but the cumulative effect on the City's fire protection capability has obviously been positive.

Station Relocation

While the total number of fire stations has been reduced during the past eleven years from 13 to 10, this does not accurately depict the situation regarding the location of fire stations. Three stations originally numbered 2, 9, 12 (exhibit) were closed in 1970 and the companies were combined into one new station numbered 12. This new station also houses the administration, training, prevention, investigations, communications and maintenance bureaus.

Stations originally numbered 5, 6, 7 were also permanently closed and their personnel was distributed throughout the other fire stations in the City.

Station number 3 was moved to another building which was more centrally located to serve the area better.

Two new stations were acquired in the annexation of surrounding communities and given permanent staff, whereas they had previously been volunteer companies.

The net effect of these relocations has been to consolidate and centrally locate the fire stations where they can provide the optimum level of service. The City took into account the physical limitations of a cliff and river as well as the changing traffic patterns that have evolved over the past several years. Also an important factor was the record of fire incidences (Exhibit II) which clearly indicated the desirability of moving certain stations.

Mini Pumpers

The City has purchased one mini pumper and plans to purchase two additional units. The mini pumper allows the department to respond quickly with a minimum number of personnel originally committed to a fire. If additional manpower and equipment are needed they can be called in very quickly while the mini pumper crew continues the fire fighting effort. The mini unit is also good for second alarm and support service because it can bring personnel quickly without committing a major piece of apparatus that may be needed for another alarm. This type of apparatus is especially valuable in a City like Quebec where there are many narrow streets as well as geographical problems such as high cliffs and rivers. The street patterns are difficult to negotiate and can cause considerable time delays for large awkward trucks.

Smoke Detectors

Recently the City has embarked on a program to promote the installation of smoke detectors. A number of detectors have been purchased by the City and can be bought at cost by any citizen. In addition, the City will install detectors in the home of any aged or handicapped person. A special program has been initiated in the area served by station number 13 which the City plans to close in the very near future. All residents in this area are having smoke detectors

installed free of charge by the City as an added protection due to the planned closing of the station. Also the City will serve this area with their mini pumper housed at a nearby station. A third improvement will also be in place before the station is closed that involves the installation of special equipment in fire trucks allowing traffic lights to be automatically turned to green, thus allowing speedy access to the area.

Sprinkler By-law

A city by-law has been prepared that will require the installation of a modified sprinkler system in all private residences, three stories or less. A committee comprised of members of the fire insurance companies, public officials, and fire department personnel has been formed to study the implications of the by-law.

Conclusion And Final Remarks

A final and perhaps conclusive test for the impact of closing fire stations and reducing personnel beyond reductions in the budget is the effect such changes have had on the communities' fire insurance rates. Quebec City has not experienced a negative change in their fire insurance rating as a result of the reduction in fire stations and personnel that has occurred over the past 12 years. According to officials familiar with Quebec City during this time of reorganization in the fire department, the last official rating of the City by the Canadian Underwriters Association was performed in 1968 or 1969. There was a new rating undertaken in September of this year; however, it is unlikely that anything but positive changes will result. These positive changes will primarily be the result of the combined innovation approach which we recently discussed. The City, according to the Canadian Underwriters Association and a few of the larger insurance companies, had a very poor fire fighting service in the early and mid 1960's. This was characterized by excessive stations and personnel, poor internal organization and quite unacceptable property loss experience. It should also be mentioned that Quebec's poor rating was due as much to the harsh winter climate and old age of their housing stock as was the condition of their fire protection system.

In the late 1960's when the City began its reorganization of the Fire Department, the underwriters watched with great concern and would have ordered a new rating if they felt that the steps being taken by the City were not the proper

ones. Therefore, while stations were systematically being closed down and personnel reduced, these changes did not, in the opinion of the underwriters, produce a greater hazard for property and lives than already existed. The City's coverage in terms of maintaining manpower and equipment within a minimum distance of five miles from a commercial or residential property along with other distance and response time standards was acceptable to the underwriters and insurance companies.

It should be mentioned that the ratings of the Canadian Underwriters Association are not as significant as they were in the past. Many large insurance companies only use the information provided by the underwriters as a guideline and, in fact, apply their own individual rating to each property in every city where they do business.

It is also important to understand that the insurance companies have two methods of rating various properties. For the larger commercial and/or institutional buildings the companies use the public fire protection classification. This system evaluates the protection capabilities of a city in terms of water supply, men, and fire fighting equipment. The rating ranges from 1 - 10, with 1 being the highest. Most cities fall into level 3, while a 4 or 5 rating is considered to be below average for an urban centre. Quebec's rating for this classification is 2.

The second type of classification is for small buildings which includes most residences. The rating scale is from 1 - 5 with 1 again being the highest; however, the criteria are not very stringent and merely involve having a full-time fire fighting force or equipment within a specified distance from each residence. Most cities can very easily obtain a number 1 ranking in the classification, as has Quebec City.

In summary, the closing of fire stations and reduction of fire fighting personnel in Quebec City has not had a negative effect on their fire insurance and it will, in all likelihood, have an overall positive impact during the next rating of the City.

	# of stations	# of firefighters	average salary	gross salaries
1967	13	542		$11,481.314
1979	10	414	$21,067	8,721.738
reductions	3	128	-	$2,696,576

Using an average annual salary for a firefighter of $21,067 and the reduced staff complement of 128 from 1967 to 1979, we can estimate savings in 1979 alone of $2,696,576[1]. This does not take into account the reduced cost of maintaining fewer fire stations or the accumulated impact of these savings over the past twelve years.

However, these dramatic savings figures must be viewed in perspective since Quebec City was clearly overstaffed and did not represent the norm for fire departments in Canada. No doubt many departments suffer from similar, albeit less severe, staff problems and can probably benefit to some degree from an approach similar to that taken by Quebec City.

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[1] This does not take into consideration fringe benefits which usually amount to approximately 35% of base salary.

IV. CASE STUDY: MECHANIZED REFUSE COLLECTION EXPERIMENT IN WINDSOR, ONTARIO

Introduction

In October 1976 the Public Works Department of the City of Windsor launched a year-long field trial of two variants of the cart system of residential refuse collection. The cart system involves the placement of refuse at curbside in standardized, wheeled, plastic containers which are lifted, dumped, and returned to the curb by a mechanical lifting device attached to the garbage truck.

Proponents of the cart system claim for it a variety of individual and collective benefits. For the community it is supposed to reduce the unit operating costs of the refuse collection service, and to promote public hygiene and environmental appearance. Cost savings are mostly a function of high cart capacities usually about four times the capacity of conventional trashcans, and of the substitution of mechancial equipment for manual labour. Where carts are used to replace backyard collection with curbside collection, cost savings are also a function of time saved at each stop. Improvements in community hygiene and appearance are attributable to the tight-fitting permanently-hinged cart lids, which prevent winds, scavenging animals and passing school children from scattering refuse about. In general, householders who have used the carts strongly prefer their appearance to the assortment of cans, bags, boxes and tied and untied piles of debris that they replace.

For the individual householder the principal benefit of the cart system is the convenience of wheeling one's refuse to curbside, with the associated reduction in the risk of lifting injuries inherent in the use of conventional containers. Since the containers are virtually air-tight and can be rinsed with a hose, plastic garbage bags need not be used to deposit refuse in them -- a source of savings for many households. And, finally, the cart system is said to make the job of the garbage man both safer, as it virtually eliminates the risk of lifting injuries, and more pleasant, as it minimizes the direct handling of all sorts of refuse.

Although the cart system of refuse collection is now used by scores of municipalities throughout the United States, Windsor is one of the few Canadian municipalities where it has been tested. But the significance of the Windsor trial is that it is fairly unique to Canada. The trial generated bi-weekly productivity data for each of the two cart systems, and for two designated control routes using manual collection, for an all-weather period of 50 weeks. Thus, claims arising from the Windsor trial are objectively testable. This feature of the trial reinforces the importance of its principal finding, namely, that unit costs of mechanical collection proved to be significantly less than those of both manual collection and mechanized tipping. Mechanical collection and mechanized tipping, also known as Rapid Rail and Refuse on Wheels respectively, were the two cart system under test. They are explained later.

Mechanical collection involved the attachment of a mechanical arm to the garbage truck thus allowing the driver to pick up and dump refuse without leaving the cab of the truck.

Mechanized tipping on the other hand required refuse collectors to wheel containers from the curb to a platform on the back of the truck which then mechanically lifted them and tipped them into the truck.

The purpose of this review is to evaluate both the trial of the cart system and the City of Windsor's outwardly paradoxical decision not to adopt the mechanical collection system. The evaluation is intended to extend the benefits of Windsor's experience to other municipalities that may wish to experiment with the cart system, and to shed some light on the general process of initiating and adopting cost-saving innovations in local government.

Background Developments In Refuse Collection In Windsor

In the five or six years preceeding the trial a number of steps had been taken to improve productivity in Windsor's refuse collection service.[1] In 1970

[1] The following information is taken mainly from a memorandum from the Commissioner of Works to the City Manager, September 30, 1975.

a total of 105 public and private employees were picking up refuse using 35 trucks in a twice-weekly collection program. Over the next five years the labour force was reduced to 42, and the number of trucks to 25, as a result of several program changes. These changes included the adoption of once-a-week pickup, the reduction of refuse packer crews from 3 to 2 men, the construction of a centrally located transfer station, and the reorganization of collection routes. During this period a satellite collection vehicle for certain types of refuse, a 1-man packer, and a high density packer were also introduced on a trial basis. The satellite collection vehicle and the one-man packer were both rejected as uneconomical, the experience with the high-density packer led the City to replace its fleet with similar vehicles following the rejection of the mechanical collection system.

# of employees	# of trucks	# of collections per week	
1970	105	35	2
1975	42	25	1
reductions	63	10	1

Against this background, it is initially tempting to view the cart system trial as the almost inevitable fifth or sixth step in an incremental sequence of productivity improvements, to see it as a logical "produce innovation" which followed the exhaustion of "process innovations" to use Bingham's distinction.

However, this interpretation ignores the changes in key personnel in the Public Works Department, and gives far too little credit to the person credited with being the prime mover of the cart system trial. The latter reference is to Mr. Payne who became Deputy Public Works Commissioner in 1971 and the Commissioner in 1972. He informed the Bureau that he first became interested in productivity about the time he became Commissioner; his interest in innovative refuse collection was triggered some time afterward when the then City Manager sent him an International City Management Association publication on the subject. At about this time Mr. Payne was actively implementing a recognized management information system designed to keep his road works managers abreast of their maintenance costs. The subsequent adaptation of this accounting system to the refuse collection service was instrumental in convincing the Ontario Government to support the cart system trial.

While the Ministry of the Environment (MOE) had a general interest in innovative refuse collection, it seems to have taken Mr. Payne's initiative to convert that interest to specific action. In July of 1975 their agent, Mr. Burnham, accompanied Mr. Payne on a tour of four United States cities to view cart systems in operation. By the end of September 1975 Mr. Payne had submitted to Council a detailed plan for a $130,000 trial, with a recommendation that MOE funding be sought. The thoroughness of the staff work on this plan may be indicated by the fact that it was implemented a year later with only two minor changes.[1] The MOE granted assistance in the amount of $100,000 (maximum) in June 1976, at which time Mr. Coulter was appointed full time Project Director.

Final details of the trial were provided to Council in September; the containers were distributed to households along the test routes during the last week of September, along with an explanatory brochure;[2] the trial began the first week in October 1976.

Our account of the preparations for the trial should have conveyed the impression that it was of relatively modest moment in the scheme of municipal activities in Windsor. In essence, it was set in motion by Mr. Payne who mustered provincial support, and who then delegated its planning and implementation to a few managers and supervisors. All of the latter who were interviewed by the Bureau reported being favourably disposed to it from the start.

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[1] It was decided to convert an existing packer for use with a mechanical arm instead of renting a suitable packer from an outside agency; and, secondly, a projected study route comprised mostly of alleys was replaced, at the MOE's request, by a route that included a condominium townhouse development.

[2] Public Works also staged a one-day demonstration of the cart system in the trial area during this week. Mr. Coulter reported that he would do more advance publicity were he to repeat the trial. He handled more calls about the cart system from (presumably envious) non-participants than from participating households.

A word should be said here about the union's role in preparations for the trial. Organized workers can normally and understandably be expected to resist, and often to oppose categorically, such labour-saving innovations as the cart system of refuse collection. In reports on the adoption of innovative refuse collection in United States jurisdictions, securing the cooperation of the union tend to be an early objective of crucial importance.

This was not the case in the Windsor trial. Rather, according to management, the union was simply made aware of the trial at an early stage. The effectiveness of this approach can be attributed largely to the City Administration's threat of several years' standing to have refuse collected by private contractors should the union obstruct cost-saving measures. (This option was instrumental in getting the union to accept a work week of four ten-hour days, which came into effect for the last six weeks of the trial). This change resulted in an immediate productivity improvement of 20 percent which has been maintained ever since. That the trial involved only a handful of workers was also contributing factor.

These considerations notwithstanding, the union did show some reluctance to participate. This was evidently overcome through discussion, and through the positive report of work with the mechanized equipment by the first worker to volunteer as trial crew.

A Review Of The Refuse Collection Experiment

The full details of the trial as it was planned, and as it was executed, can be found in a memorandum from the Commissioner of Works to the City Manager dated September 30, 1975, and in a report from the Ministry of the Environment entitled "Innovative Refuse Collection: Municipality of Windsor". As it would not be worthwhile to recount them here, we will present only enough detail to render our analysis intelligible.

1. The Mechanized Tipping System - Residents store and wheel their refuse to curbside in two-wheeled containers moulded from standard plastic. In the trial 452 80-gallon (.3cu.m.) containers serving 442 households on a residential route were mechanically tipped by a hydraulic lifting device fastened to the hopper of a rear-loading packer operated by a two-man crew.

2. The Mechanical Collection System. This system comprised a mechanical arm mounted just behind the cab of a one-arm side-loading packer equipped with right-hand drive, and two types of cross-linked polyethylene containers; 90 gallon (.34cu.m.) with wheels, and 300 gallon (1.13cu.m.) without wheels. The arm was capable of grasping, lifting, and dumping the container, and returning it to the curb. In the trial mechanical collection was begun on two routes serving 534 and 294 households respectively; the former route was served by 554 90-gallon, and 44 300-gallon containers. (The part of the latter route serving the condominium development with the large containers was discontinued after only 4.5 months at the request of the condominium residents. For ease of access by the collection vehicle, the containers had to be set in highly visible locations where they were unsightly, and from which winds often scattered them about when they were empty).

3. One route of approximately the same size located in the same vicinity, on which refuse was collected manually, was designated as a control route for each trial system. Refuse was collected on all four trial routes one 8-hour day per week for 50 weeks. Collection productivity data -- tonnes, man-hours, and costs -- were compiled for two-week periods using the Sanitation Division's management information system. Time study data for pickup and travel activities were also collected on several occasions.

4. Households along the cart system routes were surveyed in at-home interviews on three occasions: prior to the start of the trial, mid-way through the trial, and after the trial had been completed. An attempt was made to survey all of the participants on each round. These door-to-door surveys were carried out by three women hired from a local employment agency. They yielded 801, 545, and 724 completed questionnaires respectively, representing 63 per-cent 55 percent, and 74 percent of the participating households respectively.

The questionnaires used by the interviewers were designed by a committee of city representatives and MOE staff after initial suggestions were made by the Project Director. They were "pre-tested" informally using several Public Works Department employees. The most important categories of questions concerned (1) the householder's expenditure on conventional refuse containers, (2) their preferences between the cart system and the manual system, and (3) their willingness to purchase the specialized containers as individuals.

5. Apart from the difficulties with the large containers in the condominium development noted above, the only other serious problem was the breakdown of the hydraulic arm on the mechanical collection unit. It was out of service for a total of 52.5 hours, or 8 percent of the total operating time of the collection unit. Over half of this downtime occurred during two two-week periods in Nov/Dec and Dec/Jan. The problem at these times was that the cold temperatures increased the viscosity of the hydraulic fluid. No provision had been made to have a manufacturer's representative available in the event of breakdown, which was not unreasonable given that only a few pieces of equipment were involved. It was eventually decided to have the equipment modified by a Windsor company.

In contrast to the mechanical arm, the mechanized tipping equipment was only out of service for a total of 8 hours. The 80- and 90-gallon wheeled containers both stood up well. A number of multiple-family dwellings, amounting to 3 percent of all participating households, required additional containers. Only one of the more than 1000 small containers used in the trial was stolen, and none was damaged through use.

Conclusions And Final Remarks

We shall quote the productivity results of the trial directly from the MOE report:

> An analysis of variance was carried out using the cost per tonne parameter for each of the routes studied.
>
> The results of this variance testing, carried out at the 95 percent probability level, indicated that:
>
> --collection costs for the mechanized tipping were significantly greater than those for the mechanical collection,
>
> --no difference was found between the two control routes and the Division average,
>
> --no difference was found between the mechanized tipping and control results,
>
> --collection costs for mechanical collection were significantly less than for control routes.

> In summary, the costs of collection, using the cost per tonne parameter, for the mechanical collection routes were significantly less than those for either the mechanized tipping or control routes.[1]

It should be noted that an analysis of the time study data confirmed the superior productivity of the mechanical collection over the manual system.

The MOE cost-benefit analysis of implementing the mechanical collection system[2] indicated that the costs would outweigh the benefits by $347,000 per year over 10 years. That is, the system would cost $947,000 per year made up of (1) $53,000 (the $200,000 increase in the capital cost of the collection fleet depreciated over 5 years at 10 percent), plus (2) $894,000 (the annual cost of servicing the $5,490,000 debt incurred for the containers, amortized over 10 percent). The benefits amounted to $600,000 per year in salaries and fringe benefits saved. It was noted[3] that the trial "was not of sufficient scope to assess any possible effect on lost-time work injuries", another expected benefit.

From all of the data gathered in three rounds of surveys of participating households, only two findings found their way into the text of the MOE report. These came from the post-trial survey:

> ...while 75 percent of (those) surveyed were in favour of innovative refuse collection (on the grounds of convenience, cleanliness, and litter reduction), only 42 percent were willing to undertake the cost of the specialized refuse container.[4]

The response of Windsor's administration to the MOE report was to conclude "that the high capital cost of the specialized collection containers makes implementation of mechanical collection on a city wide basis prohibitive at this time".[5]

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[1] Boyko, B.I. and Burnham, A. J., Innovative Refuse Collection, Municipality of Windsor, Ontario Ministry of the Environment, August 1978, Page 26.

[2] Ibid., P. 40-41.

[3] Ibid., P. 42.

[4] Ibid., P. 43

[5] City of Windsor, "Innovative Refuse Collection Pilot Study Report", memorandum from Commissioner of Works to City Administrator, December 22, 1978.

However, the Administration implied in its report that, if the containers were to be manufactured in Canada for the $60 price paid for them in Phoenix, Arizona, or about 40 percent less than their cost for the trial, it might have considered adopting the mechanical collection system. Windsor's Council accepted the Administration's recommendations to note and file the report, and to send a copy to the Minister of Industry and Tourism. The latter action was to make the Minister aware of the jobs to be created by developing an Ontario-based container manufacturing operation in support of the widespread adoption of mechanical collection in the province.

It is worth remarking on the dates of the MOE report and the Memorandum to note and file it, namely, August 1978 and December 1978 respectively. That is, the City's formal decision not to adopt the mechanical collection system was taken about fourteen months after the trial had been terminated. The Memorandum giving notice of termination of the trial notes that "Consideration was given to extending (the trial) pending finalization of the (MOE) report"[1]. Two reasons were then given for not extending it, the first being that "the two packer units which have been equipped for the subject study are presently only being utilized one day per week", and the second being that the said two packers were needed as spare units for the relatively old fleet. The pressure exerted by the old packer fleet that was becoming older and less workable by the day was partly responsible for tenders being let for its replacement in June of 1977. The point of these remarks, then, is that Windsor's Administration seems to have ruled out the adoption of the mechanical collection system by the end of the trial. In addition to an early sense of the high capital costs of the containers, it seems to have been influenced by the prospects of increasing productivity under the manual system offered by the institution of the four-day work week.

It seems imperative to mention, in closing this section, that Mr. Payne left the Public Works Department only three months after the start of the trial to become the City Administrator. The demands of that office, which had remained vacant for several months following the dismissal of his predecessor, effectively ended his direct involvement with the cart system of

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[1] Memorandum from the Commissioner of Works to the City Administrator, September 27, 1977.

refuse collection. From that point, his involvement was limited to reacting to reports from his successor as Public Works Commissioner.

The most important questions to be answered here concern the validity and reliability of the trial's results and the appropriateness of the administrative and political reactions to them.

We can begin with the findings regarding productivity. The major findings that mechanical collection was superior to both mechanized tipping and manual collection were based on an analysis of data for each of 25 two-week periods. We could not find any serious defects in the raw data. Since the calculations were not presented in the MOE report, the Bureau performed its own analysis. Our analysis confirmed the superiority of the mechanical collection over its manual control system, although at a higher (.01) level of significance.[1]

In contrast to the MOE analysis, our's revealed that mechanized tipping was inferior to its manual control system at the 5 percent level of significance. In sum, then, within the limits of the trial there can be virtually no doubt that the mechanical collection system was the most effective.

It is legitimate to wonder how the mechanical collection system would have stacked up against a conventional side-loader with a one-man crew. Unfortunately, "such idealized control data were not obtained".[2] That this pair of collection alternatives was not tested in the trial around the financial premise of a maximum provincial contribution of $100,000 most of which was taken up with container costs. Container costs severely limited the number of routes on which the cart system could be tried. This meant that the cart pickup equipment remained idle four days per week - another

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[1] Relations in the MOE analysis were tested at the 5 percent level. When we excluded the data from the mechanical equipment breakdown periods from both data sets, the superiority of the mechanical collection system over its control held at the .1 percent level. The argument for excluding these data is that equipment breakdowns of such magnitude were not representative, inasmuch as the Sanitation Division had had so little experience with the equipment, and no backup units or replacement parts were at hand.

[2] "Innovative Refuse Collection: Municipality of Windsor", Page 37.

reason for regarding equipment breakdown periods as unrepresentative -- which explains why useful data on lost-time injuries were not generated. In retrospect it is clear to us, and to the trial staff to whom we spoke, that the scope of the trial should have been considerably broader.

Was the City's decision not to adopt the mechanical collection system appropriate? In posing the question this way we are considering the reactions of the Administration and of Council to be one. The decision appears to have been taken largely for the reason that it would cost about $5.5 million to outfit Windsor's residences with specialized containers, which only 42 percent of the participants were willing to pay for.

It is helpful to know that the City's rejection of the mechanical collection system occurred in a climate of restraint. The Mayor's (and presumably Council's) objective was to hold the line on property taxes which were the second highest in Ontario at the time. Thus it seemed reasonable on the City's part not to want to finance the containers through an increase in the mill rate.[1] But given the productivity improvements that were to be expected from the city-wide adoption of the mechanical collection system, its adoption would have promoted fiscal restraint, if the container costs could be recovered from benefitting homeowners. In regarding the finding that 42 percent of the participants were willing to purchase the $100 containers as a conclusive rejection of the cart system by the trial sample, and presumably by the public at large, the authors of the MOE report, and the City seem to have overlooked a number of important considerations.

Consider first, that in the mid-trial survey, 37 percent of the responding households indicated a willingness to pay $100 for a container while another 37 percent were willing to pay something between $0 and $50. So the 42 percent who were willing to pay $100 in the post-trial survey represented a 5 percent increase. This suggests that, to the extent that familiarity with the cart system bred support, an extension of the trial may have increased support significantly. (That the respondents in the post-trial survey were

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[1] It is worth noting that, had this course been followed, the cost of the containers to the City would have been reduced somewhat through offsetting provincial grants.

not asked whether or not they would pay some lesser amount for the container, seems to be a defect in the questionnaire design.) But, even as it was, something in the order of 75 percent of the participants were favourably disposed to pay something for a container. In our view the 42 percent who would have paid the full price constituted an unusually strong mandate for the City to have led public opinion by adopting the mechanical collection system.[1]

The second point to consider is that most of the respondents probably lacked the information that would have allowed an accurate comparison between the cost of the new container, and the cost of the garbage pails and/or bags normally used.[2] This is another defect in the questionnaire design that would probably have been discovered had it been properly pre-tested. Recent research by the Consumers' Association of Canada provides some useful cost comparisons.[3] For example, the cost of containers to a household that puts out 2 plastic bags of garbage once a week over 10 years is about $104. The cost of plastic pails lasting 3 years in the same situation would be $76. These costs would, of course, be combined for those who use both bags and pails. This is to say that the costs of the specialized containers compares favourably with plastic bags and/or pails. Then there would be the public costs of producing and disposing of containers to consider. Although we do not have comparative data, the strength of the participants' expressed preference for the specialized containers on aesthetic and hygienic grounds, would probably give them a clear edge.

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[1] For comparison, the voter turnout in Windsor's municipal elections has exceeded 42 percent only once in the last decade (Windsor Star, November 15, 1978), and, to continue the comparison, the alderman with the most votes in the 1978 elections was supported by only 22 percent of the eligible votes in his ward (Windsor Star, November 14, 1978).

[2] A question asking the respondent to estimate his yearly expenditure on garbage containers was included in the pre-and post-trial surveys. The Project Director reported that the interviewers, faced with much respondent puzzlement early on, took to cuing later respondents. Paradoxically, while .5 percent registered "no opinion in the pre-trial survey, 11.3 percent had "no idea" of such costs in the post-trial survey.

[3] "Garbage Bags vs. Pails", Canadian Consumer, June, 1978, PP.29-32.

The point of these two considerations are that there was more solid support for the citizen purchase of containers than the City seemed to appreciate, and that the near-support could have been encouraged by means of a modest public information campaign.

Finally, it is worth considering that the Municipal Act provides a number of ways that the City could have recovered the costs of the containers from the user-households through the tax collection process, on terms agreeable to most (e.g., spreading the payments out over 2 or 3 years). Granted, a small percentage of container recipients could be expected to refuse to pay on any terms. But, then, each year a small percentage fails to pay its regular taxes also.

Our position, in sum, is that (1) the participant's strong preference of the cart system over the manual system, (2) their readiness to pay the full, or partial, cost of a specialized container, and (3) the proven public benefits of mechanical collection, seems to have constituted a warrant for at least the continuation and expansion of the mechanical collection trial in Windsor.

V CASE STUDY: COMPUTER CONTROLLED BUILDING MONITORING SYSTEM IN WINNIPEG, MANITOBA

Introduction

The City of Winnipeg, Civic Properties Division, has implemented a computerized Building Monitoring System which monitors and controls simultaneously the heating, ventilating, air conditioning, security, fire alarm, lighting and maintenance functions for a number of civic buildings. There are currently thirteen city-owned buildings being monitored, all from the basement computer centre of the City Hall Administration Building in downtown Winnipeg. The types of buildings being monitored are libraries, swimming pools, arenas, car parks and administrative buildings. The thirteen buildings being monitored and their distances from the City Hall computer centre are shown in Figure I, page 37.

The most outstanding savings associated with the building monitoring system in Winnipeg are labour savings, resulting from reduced staffing requirements and energy savings, resulting from a number of innovative uses of the system.

Background To Implementation Of The Innovation

The idea of a building monitoring system in Winnipeg was originally conceived in 1974 when a number of civic buildings was being slated for construction, which demanded massive new staff requirements. This demand for labour was under special consideration at this time because the creation of Unicity had brought the responsibility for all civic buildings under one department. As staffing requirements increased due to demand for new staff in the civic buildings under construction at that time, it became apparent that some change was necessary to overcome the rising costs of labour.

Investigations into the various types of building monitoring systems known to be labour-saving were undertaken at this time. There were a few models in operation and these were visited by representatives of Winnipeg Civic Properties Division. These models were located at the University of Edmonton, the Saskatchewan Telephone System in Regina, the Manitoba Provincial Government offices (under consideration also at that time and later implemented), the

Winnipeg Convention Centre, and the Illinois Bell Telephone Company in Chicago which monitors 100 buildings. Information was also received from the City of Boston where a large system is in operation which has brought over 100 schools on line with their system.

The City of Winnipeg chose the Johnson-Control system, named the "JC/80" because of its superb man-machine interface. This computer monitoring system utilizes a very simple and readable printout in words for a supervisor to immediately comprehend without having to decipher a highly sophisticated, coded language.

The decision-making process leading up to the implementation of this system, including both the research period and approved time, took approximately four months. The idea was originally conceived within the Civic Properties Division of the Department of Works and Operations in 1974. There was no outside hiring for consulting work and all research into the system was done internally. A quite lengthly cost-benefit analysis was prepared at this time, with particular emphasis on the labour costs to be saved. (Because there were fewer studies already completed at this time, this lengthy research was required. However, other municipalities can now learn from the experience gained by this Winnipeg example). The work was then submitted to the General Manager of Works and Operations and to the Commissioner of Works and Operations who is responsible to the Committee of Works and Operations where approval was attained. Given the costs and savings figures, there was no real difficulty in the approval process. There was also no difficulty with personnel nor the unions in implementation of the system. Usually there will be some resistance to new technology. However, in the case of Winnipeg, no staff had to be fired or replaced primarily because most of the buildings were new and no staff had yet been hired. Thus the savings were associated with reduced requirements for staffing. In the case of putting the monitoring system in place in existing, older buildings the existing staff were contracted workers, so no problem arose here in personnel either. Some re-training did occur to bring a few workers up to the supervisory level for the jobs requiring immediate operation of the computer system. According to both the managers within the Civic Properties Division and the workers operating the central control office, job satisfaction has increased due to more interesting and more significant work under the new system. In addition, "customer" satisfaction has increased. Customers in this case are using the various public buildings. Due to the advance warning of any problems received

by the central control office, problems are often corrected before the customer has become aware of its existence.

A Review Of The Building Monitoring System

The original Capital investment by the City amounted to $105,000 for a monitoring system in one building, the Centennial Library in downtown Winnipeg. This cost covered the entire computer and installation costs in the central control room at City Hall, as well as the installation of the field sensing devices at the Centennial Library.

The total investment now amounts to $400,000 with the other twelve buildings having been brought on line. When this cost is amortized over twenty years, and maintenance costs are deducted, the net savings are estimated at approximately $150,000 annually.

The greatest savings so far have been in labour costs at each of the buildings. The savings figures at each of the buildings are shown in the cost evaluation breakdown in Figure 2. The total annual savings in labour are shown as $192,830.

Quite substantial savings are also being made in energy and electrical demand at this time totalling $32,000 annually. It is expected that as more innovative techniques, now being studied are incorporated into the computer monitoring system, the energy savings will begin to equal the labour savings and may even overtake them in the future.

Among the most innovative cost saving techniques possible with the building monitoring system is the practice of electrical load shedding. With this technique, the computer is able to reduce what is known as "peak power demand" and therefore, sharply reduce and save on electricity costs. Since the peak demand has now become a significant portion of all electrical bills, the "JC-80" system enables greater cost savings by minimizing demand charges. This is performed by the system's ability to selectively control electrical loads. A desired maximum level of energy use is fed into the computer and the total energy demand pulses are monitored, for example, in a recreational swimming pool. Here all of the pool heaters, and the water heaters for the showers, for

Figure II

JC/80 BUILDING MONITORING SYSTEM COST EVALUATION

1. Number of buildings monitored (including Civic Centre Carpark on-line, October 1, 1979)	13	
Number of functions monitored approximately	500	
2. Approximate total capital investment		$ 400,000.00
3. Savings		
a) Labour		
i) Centennial Library		
3 Building Servicemen 11 @ $19,333./yr (incl. 30% overhead)		$ 58,000,00
ii) Concourse and Winnipeg Square Garage		
4 Building Servicemen 11 @ $19,333./yr.		$ 77,330.00
iii) William Avenue Library		
5 Janitors or Contract Security. Most economical is Contract Security @ $5.00/hr.		$ 34,000,00
iv) 100 Main Street & 10 Fort Street		
Contract Security		$ 23,500,00
TOTAL LABOUR		$192,830.00

con't...

Figure II (con't)

b) Electrical Demand and Energy Savings

i)	Sargent Park Pool	$ 10,000.00
ii)	Civic Centre Carpark	$ 12,000.00
iii)	Additional energy savings due to Manual and Programmed start/stop building heating and cooling systems (estimated)	$ 10,000.00
		$ 32,000.00

TOTAL a) & b) $224,830.00

SAY $225,000.00

4 Annual Investment Cost and Maintenance

Investment Ammortized at 10.5% over 20 years

400,000 X .1215 $ 48,600.00

Maintenance - Labour and Parts $ 28,000.00

$ 76,600.00

NET SAVINGS:

$225,000 - $76,600.00 = $148,400.00 SAY $150,000.00 Annually

example, are monitored. If the accumulated use of energy begins to reach that maximum, one group of loads (for example, one pool heater) will be temporarily shed, or shut down. The individual heaters are ranked in order of importance and the least important is the first to shut down. The shedding will continue until an ideal level is reached, at which the total demand is averaged over the demand intervals and then the heaters will begin to come back on automatically. The shedding occurs quite rapidly and the temperature of the pool or the shower is so slight it is never noticed by the users. The savings on electrical costs are growing constantly.

A similar technique has been studied with respect to the Civic Centre Carpark to determine the potential cost savings in controlling the electrical power demand for the block heater receptacles. The study indicated that $10,000 (at 1978 electrical rates) could be saved annually and that no detrimental effects would occur in the starting of automobiles when the power is shut off for 10 minutes and restored for 20 minutes. With the "JC-80" computerized monitoring system, eight zones would be set up covering the entire carpark and the 10 minute shedding would occur on a rotational basis in the car park. The cost of this proposal is $15,000. Clearly, given the annual savings figures of $10,000 in electrical bills, the cost is recovered.

A number of other techniques are also in place that lower energy costs. The monitoring system uses a special method in the cooling of the buildings whereby it can choose to use either outside air or the return air, whichever has the least total heat at the time it is needed. It is believed that most buildings today use 25 to 50 percent more energy than is actually needed to operate them. Other techniques on the JC-80 such as programmed start-stop and night setbacks have also shown dramatic savings in the Winnipeg buildings.

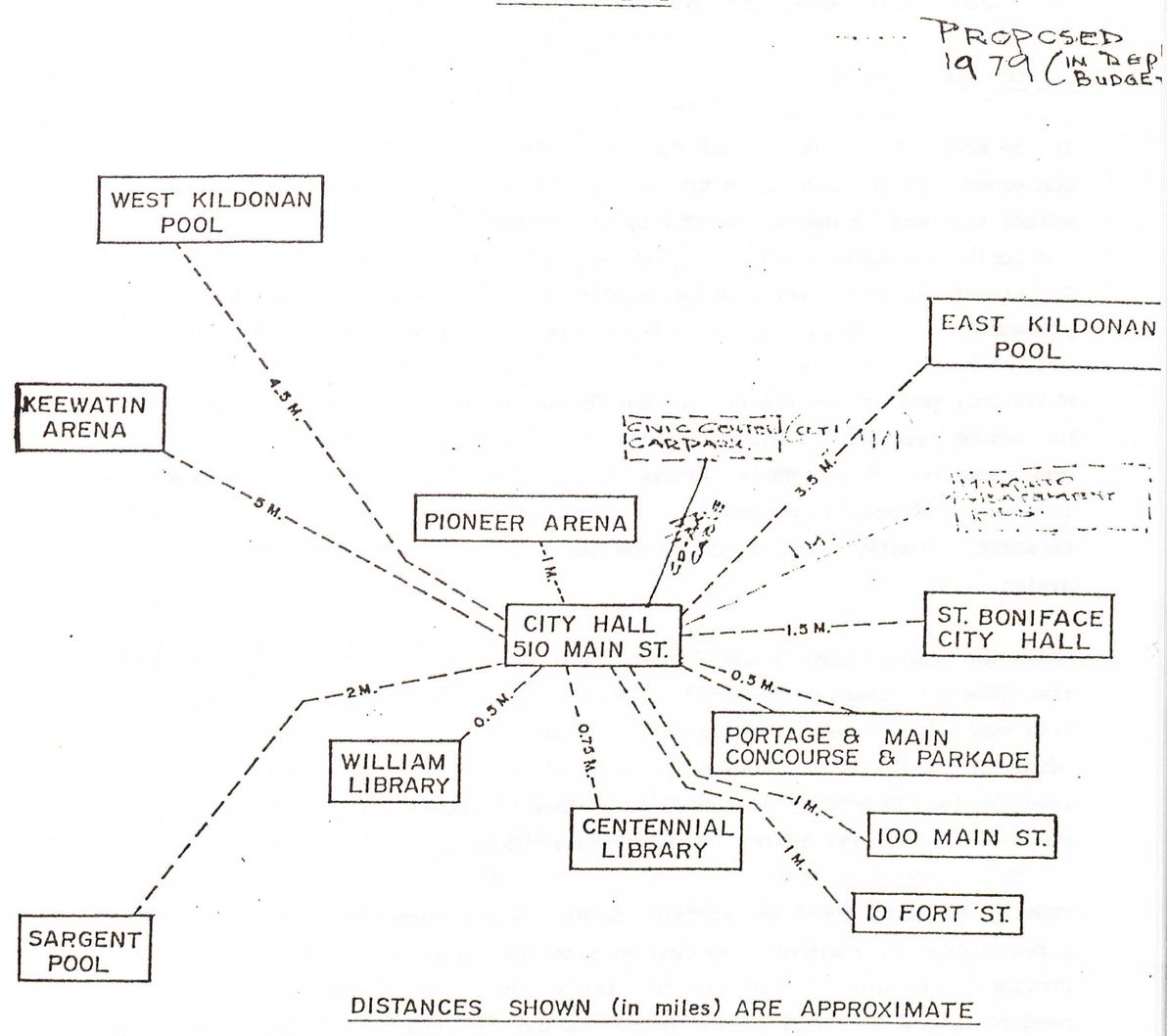
There are, also a number of intangible savings associated with the Winnipeg buildup monitoring system. The use of motion detectors, for example, on line with the computer have led to savings by reduced labour requirements (i.e. no night time security is required). However, there are also those savings associated with the prevention of burglary and vandalism in those buildings arising from the existence of those motion detectors. Similarly, the advanced warning of a problem in one of the buildings prevents further costs from arising due to extensive damage. The speed of an emergency call reaching the police

headquarters has a number of intangible savings associated with it as well. The JC-80 also monitors the carbon monoxide level in the parking garages and an alarm sounds if a dangerous level is approaching. The advance warning has clear savings attached to it and further damage is prevented.

Conclusions And Final Remarks

There seems to be a great deal of satisfaction and pride in the Winnipeg building monitoring system by both its operators and its users. All the other departments using the system, including the police department, and the recreation and fire departments, are as enthusiastic about the improved efficiency and the cost savings as are its innovators and operators. As other departments and buildings begin to show an interest in coming on line, an initial analysis must be done on what it is that needs to be monitored. This is the central factor in determining whether the system can generate cost savings. Given the costs associated with setting up the field sensing devices, the need to monitor a certain activity and the gains to be made from it must be clearly established at the outset. As shown in this Winnipeg example, if the activities to be monitored are well planned for, the savings can be substantial.

FIGURE I



DISTANCES SHOWN (in miles) ARE APPROXIMATE

INSTALLATIONS AS OF 78 10 03

VI CASE STUDY: TRANSIT COMMUNICATION SYSTEM IN METROPOLITAN TORONTO

Introduction

In the early 1970's the General Manager of the Toronto Transit Commission became concerned with the increasing traffic congestion in Metropolitan Toronto and the effect this was having on the quality of surface transit. The existing method of monitoring the surface transit system was slow as well as labour intensive. Adjustments in routes were not being made with the best information and the pressure on the transit system to improve performance was growing rapidly.

While this problem was present in many urban centres around the world only a few had given serious consideration to or introduced any kind of advanced communication system. These efforts in London, Paris, Stockholm and Zurich were in a very embryonic stage and the TTC was in the unenviable position of having to start virtually from scratch in the design of a communication and information system (CIS).

While the main concern of the TTC was the maintenance of a sound reliable transit system there were also concerns for efficiency and the cost of operating this expanding system. Population growth was continuing at a rapid pace, but often suburban densities did not prove sufficient to sustain a frequent surface level route. Ridership fluctuated with fare increases and the struggle to compete with the convenience of the private auto continued.

Clearly, if the TTC was to maintain its excellent reputation for good service at a reasonable price without counting on sizeable subsidies from Metro or the Province, something must be done to improve their management capability. The need for a new method of gathering information on transit users, routes and emergency situations was evident to all concerned.

Background

Operations of the TTC surface fleet of buses, trolley coaches, and streetcars are complicated by many factors. On an hour-by-hour basis there are passenger, driver, and equipment emergencies which may require immediate action to maintain safety standards. There are passenger load fluctuations and varying traffic

conditions which may require a wide variety of supervisory actions to maintain schedule reliability. There is assistance and service information to be provided to passengers. Most of these events must be logged daily, and over the longer term, must be summarized along with ridership information to provide a basis for changes in operating procedures, schedules, routes and equipment so that the TTC can continue to anticipate and adapt to public transportation requirements in Metropolitan Toronto.

These functions are now carried out by a variety of procedures which involve route inspectors, mobile supervisors, controllers, dispatchers, traffic checkers and maintenance personnel in the field, as well as the drivers, office staffs, and road crews of the TTC operating departments. While the existing procedures work remarkably well considering the complexity of the system and its operating problems, it is clear that improved means of communicating with the surface fleet and handling information relative to its operation would be of material assistance.

The TTC has been considering for some time various types of improved communications, ranging from two-way voice radio communications with drivers to more sophisticated electronic equipment for data transmission and information display. As part of this process, Peat, Marwick & Partners were retained during the fall of 1972 to work with TTC staff in designing a study which would evaluate communications improvement alternatives and make recommendations relative to their implementation. A Study Design Report was submitted on December 18, 1972, provincial financing was arranged, a Joint Study Team was formed, and the study began in May, 1973.

Study Approach

A two-staged approach to the study was approved. The first stage, consisted of three phases as discussed below.

Phase 1 involved field studies of traffic and operating characteristics, and passenger loadings on six TTC surface routes. The routes were selected to cover both downtown and suburban type conditions as well as three types of surface vehicles - buses, trolley coaches and streetcars. A second major thrust of Phase 1 was a detailed examination of existing TTC procedures for monitoring and

controlling surface fleet operations and an analysis of the numbers and types of supervisory and emergency events which take place on a typical day. From this emerged an understanding of the role which communications and information handling processes play in the existing TTC surface fleet monitoring and control procedures, and types of control strategies which might be studied in an attempt to enhance these procedures.

Phase 2 concentrated on the types of communications and information handling hardware and systems which are available and/or now being developed. This phase involved an inspection trip by members of the steering committee and study team to some eight properties in Europe and two in North America which are developing and/or are using various types of electronic communications equipment for this purpose. From this phase of the work emerged an understanding of the seven basic types of electronic communications equipment for this purpose. From this phase of the work emerged an understanding of the seven basic types of functional systems which can be used for surface vehicle monitoring and control purposes and an appraisal of the effectiveness of each for various fleet operations procedures.

Phase 3 identified six basic monitoring and control strategies and evaluated alternative communications systems for meeting the requirements of each strategy. This produced a recommended system which appeared to meet the existing and expected future surface vehicle operations requirements of the TTC.

The expected costs and benefits of the preferred system were evaluated, and questions which should be answered before a full scale system is installed were identified. A pilot project to answer these questions was recommended, and the content, duration and resources required for the pilot project were defined.

The Recommended System

The study team recommend an improved Communications and Information System for TTC surface vehicle operations with the following potential features.

Route Supervision

The system would be capable of transmitting continuous data on vehicle location, passenger loading and other route information from each vehicle for display at a

Control Centre or at an inspector's console. The inspectors, in turn would have the capability of transmitting supervisory information to the driver by digital means. With these features there should be:

- more effective route supervision
- more reliable scheduling
- reduction of bunching and passenger overloads
- closer working relationships with drivers

Emergency Handling

The proposed system would have full selective call two-way voice and data radio communications between all surface vehicles and control centres for:

- immediate emergency identification
- faster emergency response times
- greater attention to passengers in distress

Dynamic Scheduling

The system would be capable of collecting and processing continuous data on passenger movements on each surface vehicle so that a faster, more responsive service can be scheduled.

Management Reporting

The system would be capable of processing the transmitted data from each vehicle for the automatic logging of events and the preparation of more complete management reports.

Passenger Information

The system would be capable of addressing the passengers on the vehicles, and of providing real-time information to passengers phoning in and at major bus stops to reduce passenger uncertainty.

Traffic Signal Priority

In addition, the proposed system would be capable of transmitting continuous data on vehicle locations and passenger loadings to provide a possible interface with the Metropolitan Toronto Traffic Control Computer for traffic signal priorities.

Expected Costs And Cost Savings

It was estimated in 1974 that the capital cost of this system for a surface fleet of 2,000 vehicles would be approximately $8 million. On the conservative assumption that the hardware life would be ten years, this represents an annualized capital cost of $1.2 million plus an estimated annual system maintenance and servicing cost of $0.3 million, for a total cost of $1.5 million per annum. No additional operating costs are expected as present personnel would operate the system.

There are opportunities for certain cost savings based on the introduction of this system, in the range of $800,000 - $3,000,000 per annum, based on more effective use of present route inspection and supervisory staff, more efficient allocation of vehicles to routes, and a slight enhancement of vehicle operating speeds.

It should be emphasized, however, that the major argument for introducing the proposed Communications and Information System is based upon the improved level of service and information which will be provided to staff. It was the view of the study team that these are major benefits, and alone may be sufficient justification for installation of the system. It seems quite likely, however, that, in addition to these benefits, annual cost savings may be achieved which are equal to or greater than the annualized cost of the proposed Communications and Information system. These anticipated savings are to be measured in the pilot test.

The Recommended Pilot Project

It was recommended that the pilot project design phase include, in parallel, installation and testing of hardware on up to ten surface vehicles, and the installation of a small central computer and information display, so that hardware operations can be tested on a preliminary basis. This phase, including

both the preliminary hardware testing and the pilot project design, would require about one year to complete.

The pilot project itself would involve installation of the communications equipment on some 100 surface vehicles, so that desired operational testing could be carried out on a variety of routes. This would include testing a number of approaches to the various control activities, and measurements of the efficiency and effectiveness of the various approaches relative to each other and relative to existing control procedures. Ideally, the pilot project should involve such testing over at least a full 12 month period, and possibly longer.

Conclusions And Final Remarks

The original timetable for completion of the pilot project and full implementation into the Metro Transit system fixed December of 1976 as the date of final implementation. The most current estimate for completion of the pilot project is now December 1979 with implementation at least a year or two down the road. The lengthy delay, according to TTC officials, was caused by the very unique nature of this project. New equipment had to be designed. The estimate on computer program time required was originally 4 man years and had to be expanded to 13 man years. Competitive bidding on various equipment and consulting jobs further delayed the project. And finally, there were other small problems such as a supplying company going bankrupt which added to the delay.

In spite of the problems encountered with the pilot project, there remains a very high level of optimism for the eventual success of the project. The need for improved information and communication capabilities is greater than ever, and there appears to be no resistance to the project.

Capital costs have increased slightly since 1974 from $1.2 million to $1.5 million, but this should be expected because of inflation. The per vehicle cost is still estimated at between $5,000 - $6,000 with total cost for introducing the equipment into the entire surface fleet placed at $13 million to $15 million. It is not anticipated that this investment will be made immediately after completion of the pilot program. Rather, a phased introduction is planned with approximately 250 vehicles being added on each occasion.

Many of the final decisions regarding implementation will have to await the evaluation of the pilot project. It is at this time that the final cost benefit figures will be available along with the actual impact on service of the new information and communication system.

VII SUMMARY OF CASE STUDY FINDINGS

In each of our five case studies the impetus to introduce a cost saving innovation came from a locally identified need. Cost was the dominant factor in most cases, but in at least two instances, (Bridge Crane Truck and Transit Communication System) there was a definite need to deal with a problem of service delivery. None of the innovations came about as a result of a chance discovery in one of the several professional magazines available to municipal officials. And there does not seem to have been much impetus from elected representatives with the possible exception of Quebec City. In every case, the need to innovate and save money was initiated and implemented by imaginative administrative personnel.

This is not to say that magazines and information from other communities did not play an important role. In each case, valuable information was located in magazines or individual contact with cities known to be progressive in the area under examination. Also, we cannot be certain of the exact input that magazines, conferences, or other sources of information may have had on the individuals responsible for suggesting each respective innovation. It may have been an accumulation of information and ideas from such sources that set the wheels in motion and identified the problem area.

In only one case, Quebec City, did the innovation come about as the result of a pre-planned overall operational review. The four other innovations were identified by individual observation and suggestion.

Consultants played an important part in all but one of the innovations. Only the Bridge Crane Truck was identified and implemented without the assistance of consultants. In two of these case studies, task forces and pilot projects were also seen as necessary (transit communications and refuse collection).

The innovations examined in our 5 case studies occurred during the past 12 years especially in the early 1970's. This was not an unusually difficult time financially for municipalities in Canada as most were experiencing fairly steady growth in population and were in a sound financial position. In other words, the political climate did not dictate that cost saving ideas were in the forefront of public debate. In fact, most municipalities were still locked into the service provision philosophy with the only concern being how to get the services in rather than how they would be paid.

impetus - cost stimulus - admin.

In only one case (Winnipeg Building Monitoring System) was the need to innovate the result of a dramatic administrative change. The consolidation of several municipalities into one unit created the need for new buildings and alert public officials saw a chance to save money by automating various building maintenance related functions.

An alert department head or middle management employee was responsible in every case for the initiation of the cost saving idea. Very little politics came into play at anytime as each administration proceeded cautiously taking little risk in the process. The philosophy in place was obviously "take your time and be sure - hurry and perhaps lose".

The shortest implementation time for any of the innovations was about 1 year for the bridge crane truck. Winnipeg and Windsor spent at least 2 years on each of their projects while the Metro transit and Quebec Fire projects took 6 to 12 years respectively and are still continuing. It would be merely speculation as to whether any of these innovations could have been introduced in a shorter period.

Employee acceptance of technical or managerial innovations is difficult to assess. Sometimes employee resistance is based on fear of losing their job or a general apprehension of change. There may also be an organized resistance spearheaded by one or more of the unions. Their fears may be real or imagined, but can always spell trouble unless dealt with very early in the implementaion process.

None of the innovations examined in our case studies appears to have been hampered by any measurable employee resistance. This is probably because in each case reductions in staff have been accomplished through attrition or by acceptable transfer programs to other departments. Only in the Quebec Fire Department has resistance to continued staff cuts been questioned by the employees. This is probably caused by the strong historical basis for equating fire fighting capability with manpower. Gradually, this problem seems to be disappearing as employees recognize the compensating advantages of improved equipment and procedures.

In each of the remaining four innovations, employee apprehension has been replaced by employee enthusiasm with very few problems being encountered.

Administrators and department heads seem to have been acutely aware of the potential problems with employee resistance and were careful to develop education and information program. In some cases, films were used in these orientation procedures and employees were involved in the decision making process. There would appear to be a direct relation between employee involvement and the level of employee acceptance of the innovation involved.

While each of five innovations studied has cost saving potential, some have been easier to measure than others. In the case of fire protection, refuse collection, and building monitoring the cost savings have been fairly easy to substantiate. These services were primarily labour intensive and the innovations allowed the cities involved to reduce their manpower requirements. Only in Windsor was the innovation not implemented, but this was only because the City felt the capital cost was too high. This may be reconsidered as a result of new calculations.

In the bridge crane truck and the transit communication system, different factors have affected the ability of staff to accurately measure the cost savings to be realized. With the bridge crane truck, the roads department knew savings were substantial, but was not pressed to develop actual figures because the truck was purchased from the existing capital budget. Also the department has been using the truck for a variety of functions which might make accurate cost benefit figures more difficult to obtain. What really seems to be the case is that staff involved simply did not bother to develop an evaluation model. This will probably occur in the near future especially since the department would like to purchase more similar units.

The Transit Communication system is only in the pilot project stage and should have detailed cost benefit data at the conclusion of this stage.

Certainly the presence of actual or potential cost savings cannot be denied for the five innovations we have studied, but as such efforts reach into other softer services there will be increasing difficulty with evaluation efforts. The real problem may not be determining how much was cut from a particular operation, but what happened to the level of service when these cuts occurred.

While there has been no formal evaluation into how well known these five innovations are with the Canadian municipal community it is safe to assume that

knowledge of them is not widespread. This can be assumed because there is no formal vehicle for sharing such information on a national scale. This is especially true of the bridge crane truck and the building monitoring system since they are likely the first innovations of their type in Canada.

Interviews with both elected and appointed people at the local level reveal an overwhelming support for the establishment of some information sharing system between municipalities. Certainly experience from the U.S. indicates that such systems can be highly successful in terms of innovations submitted for publication as well as willingness of municipal users to pay for such a service.

Whether such enthusiasm and previous success translates into a successful program for Canadian municipalities is not certain. There are few municipalities in Canada to help share the cost of such a program and there are few national organizations and agencies with a capability of undertaking such a task. Because of the different relationship between the national government in Canada and municipalities, to that of the U.S., it may be more feasible for Provinces to look at the establishment of such information sharing programs. The need for an improved method of transferring cost saving innovations seems undeniable. What is needed is a thorough examination of the feasibility of such a program by all the interested parties.

VIII WHAT CAUSES A MUNICIPALITY TO INNOVATE?

It has been stated emphatically that the prime mover in the initiation of a cost saving innovation is usually a progressive municipal administrator, a concerned employee or a politician. But these individuals must have been motivated by several factors other than the overall improvement of the municipal corporation. During the course of conducting our case studies, three reasons for adopting innovations were frequently repeated.

1) keeping taxes down
2) improvement of employee work place
3) improving delivery of services

Keeping Taxes Down

This was probably the prime factor in four of our five case studies with only the Metro Toronto Transit innovation having other factors considered more important. While none of the cities involved were facing a financial crisis, there was a concern for growing local tax levels. Only in the case of the bridge crane truck was there very little political involvement with the cost saving attitude prevailing within the administration. By becoming more efficient, the Metro Toronto Public Works Department was hoping to minimize the impact of budget cutbacks, thereby maintaining an acceptable level of service. In Winnipeg, Windsor, and Quebec City, the concern was much more politically motivated in terms of having broad political appeal and support. Perhaps this was the case because the potential size of the savings gives some indication of the level at which elected persons become involved in the innovative process. A rule of thumb for political involvement might be any innovation that could potentially reduce the mill rate by 1/2 mill or more. Other criteria could include the number of employees to be affected, the area of the city to be affected, or the portion of the city's operation that is involved. While no finite lines for political involvement can be drawn, the general goal of keeping taxes down is one that seems to be a strong motivational force in the implementation of cost saving innovations.

If controlling tax increases is a primary factor in promoting innovation, then avoidance of labour intensive activities is a secondary factor. In all five case studies, there was concern expressed for the growing cost of labour and the

increasing need to find ways of providing these services with fewer employees. This would appear to parallel the automation period which occurred in the private sector when increasing labour costs started to dip into profit margins. Municipalities are very heavily service-oriented and therefore have high levels of labour concentration. The growing strength of public employee unions and general inflation have pushed wages and fringe benefits very high in a short period of time and administrators, as well as politicians, see labour costs as a prime target for keeping taxes down. Statements supporting this theory were strong in most of our case study cities, although there was much care taken to emphasize that staff reductions were occurring through attrition. Unions and employees generally have offered only token resistance to these changes either because good relations existed between management and labour or the programs were phased in carefully with emphasis placed on employee education and involvement. These efforts seem to work well, as employees remaining on the job seem more satisfied when the changes have been implemented.

Improvement of the Employee Workplace

Usually this factor of the innovation process is secondary and mentioned only as a by-product of the cost saving effort. The bridge crane truck not only reduced the risk for employees but also eliminated a difficult and tedious manual task (that of building scaffolding). The Windsor refuse collection project also would have limited the manual labour of dumping garbage cans had the new system been implemented. In both cases employee injuries certainly were of prime concern along with the reduction in labour. In the other three innovations, employees indicated that their workplace was a more satisfying place but the final results were not in concerning the Metro Toronto Transit experiment.

Improving Delivery of Services

The Metro Toronto Transit experiment would probably claim this factor as the prime reason for innovative efforts. Of course, a direct benefit of better service would probably be increased ridership and thus increased revenue. This would not be the case in the areas of refuse collection or fire protection where better service could possibly occur but with no impact on revenues. In fact, in each of these cases, it would have been acceptable to maintain the existing level of service. In at least four of our five case studies, an important by-product was a considerable increase in the quantity and quality of

operational information available to administrators and politicians. This information could also be instrumental in prompting changes in the services provided which could be beneficial to the public.

As we indicated at the beginning of this section, there is usually not one isolated factor that triggers the introduction of a cost saving innovation, but a number of related and/or unrelated factors.

IX PROBLEMS OF EVALUATING INNOVATIONS

It is well and good that municipalities should seriously look at the implementation of various cost saving innovations. However, as we found out from our case studies, there has been little if any systematic effort to evaluate these innovations. The entire municipal sector in North America seems to have become caught up in trying new ideas while avoiding any critical review and evaluation. There are a number of reasons why this is so.

1) Innovation on a comprehensive, systematic scale is still in the embryonic stages in North America and prior to this stage very little operational evaluation was undertaken. It was assumed that many government services could not be measured and therefore efforts at evaluation were considered fruitless. This theory is being challenged and experimentation has already disproven this myth.

2) Canadian local governments have been even less anxious to measure service levels than their American counterparts. They have not experienced the same financial crisis brought on by deteriorating downtowns, large welfare costs and substantial loss of industry, especially in north-eastern United States. Canadian municipalities are starting to feel the pinch and have been looking at operational review procedures that have been developed south of the border. Some Canadian municipalities have also begun their own internal reviews.

3) Municipal accounting systems need to be drastically altered before any serious operational reviews can be accomplished. There is little uniformity from one province to another and often little standardization within provinces. It is difficult to segregate important data for operational review because it is not known what information was important. A prime example of this can be seen in our Quebec City case study where information on response times has not been collected and evaluated even though this is considered the most important information for evaluating fire department performance. Only once in a ten year period did the City evaluate response time data.

4) The provinces have not taken a strong initiative in this area of standardized statistics or accounting procedures. They have dealt with municipalities from a position of strength and treated various program and funding adjustments from a political perspective rather than from an analytical one. Provinces have been content to give per capita grants and leave municipalities to figure out for themselves whether or not they were efficient.

5) Availability of sufficient revenue from the provinces also contributed to the lack of urgency regarding reform of municipal information systems or operational review procedures.

6) Canadian municipal government is traditionally non-partisan and to some extent this limits the debate on certain issues and does not encourage an adversary relationship regarding certain programs and policies. Some political theorists argue that the party system stimulates debate and forces the party in power to become more accountable in terms of questions regarding efficiency effectiveness.

7) In conjunction with the non-partisan nature of Canadian local government is the increased relative strength of the local civil service. While politicians come and go, the department heads and employees are in place for extended periods of time and build power bases of their own which are difficult to penetrate during the short political life of a municipal councillor. Certainly this could lead to a lack of accountability in terms of political control over the administration, especially as programs and services grow larger and more complex.

8) Lack of public involvement in local government has also been seen as a contributor to poor performance evaluation. In only one of our case studies (Windsor) was the public closely involved in the decision to make adjustments in the municipal operation. Politicians and civil servants have, to a large extent, considered citizen participation as a costly and unnecessary element of the decision making process. Little that we uncovered in our case studies indicated that this has changed recently. However, the lack

of public awareness has created apathy and allowed accountability to be non-existent between the taxpayers and public officials. The current "tax revolution" is the outgrowth of this poor accountability and lack of communication and can only be viewed as an inevitable response to the closed attitudes which have prevailed in the past.

X EMPLOYEES - AN INTEGRAL PART OF INNOVATION

Evidence gathered during our case studies suggests that efforts aimed at introducing innovations at the local level must deal with the question of how public employees are affected. Many of the innovations introduced at the municipal level have come from employees on the front line, providing services directly to citizens. Most innovations need the cooperation of public employees if they are to be successfully implemented. If money is to be saved by implementing innovations, certainly the labour intensive nature of local government dictates that public employees must give their cooperation and consent to most changes being considered.

It would appear that cost saving innovations at the local level have at least two major hurdles to overcome in order to become a serious and permanent part of the municipal scene.

1) Myths, misconceptions, and fear of change must be overcome and replaced with a desire to experiment and seek a better way of providing municipal services. This is equally true of elected representatives and municipal administrators.

2) Municipal employees must be made an integral part of each effort to implement a cost saving innovation to ensure quick and permanent application of new techniques and technologies.

We have dealt as thoroughly as possible with the procedures used in implementing innovations, factors affecting success, as well as the actual economies realized. However, the question of how to deal with the concern for public employee involvement in the process of innovation has not been answered. We must look beyond our case studies to experience gained in foreign jurisdictions, as well as in a few Canadian municipalities not included in our case studies. Through such a review perhaps we can fill the gaps left by the case study analysis to gain insight into factors affecting employee motivation. This will also give us an opportunity to examine the efforts of some more advanced Canadian cities at establishing a permanent, full-time system for evaluating procedures for bringing in various technological and managerial changes.

In improvement projects by industry and government, various definitions have characterized "productivity". However, it has been found that efforts to improve productivity which focus on cost reduction alone suggest management pressure to increase output per man hour. Labour productivity begins with good planning by management and the conscientious effort of the employee. The crucial question is how to translate theory into practice. Concomitant aspects of the production process are sound investment, use of technology, better techniques and greater efficiency. In industry, competitiveness and the quality of the product enter into the cost factor.[1] From experiments in industry and government, it is evident that three aspects - the individual, machines, and organization - have been involved in bringing about greater productivity and job satisfaction.

The Private Sector as an Influencing Factor

The idea that financial incentives coupled with employee participation in traditional management functions leads to greater productivity and job satisfaction was conceived in the 1930's by United Steelworkers Vice-President Joseph Scanlon.[2] The "Scanlon Plan" has been applied in various forms in industrial experiments where employees (and unions where applicable) participate in company decisions about organization, job design, and information sharing. Special financial rewards are given in recognition of input. The theory is that job satisfaction reaches beyond the concept of adequate pay, benefits and good working conditions. Essentially, it means some control by the worker in connection with the work performed, continued interest and sense of responsibility. This motivational approach benefits worker and employer alike and has been widely applied in Europe and the United States in restructuring the quality of work life.

The motivational approach constitutes a departure from the separation of tasks in the interest of "efficiency" which has contributed to worker alienation. Where work is of necessity segmented as in assembly line production, innovative methods have included job rotation by workers to lend variety and a greater understanding of the process of production as a whole. The result has been higher job satisfaction.

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[1] Edward M. Glaser, Productivity Gains Through Worklife Improvement. Ch.1, pp. 2 - 25, Harcourt, Brace Oovanovich, 1976.

[2] Edward M. Glaser, Op.Cit.

The research branch of the Ontario Ministry of Labour, has produced a survey of 25 Ontario firms who have used various innovative work arrangements.

The most frequently cited reasons for embarking upon an innovative program were to improve communications or to prevent development of a communications problem between management and workers and/or union; to achieve improved productivity; to involve the employees in job identification and promote a feeling of being able to contribute; and to achieve individual, union or company goals and needs.
Other reasons were that traditional ways of running the company were not working out and occasionally, new programs were embarked upon as an expression of the personal values or beliefs of a top executive in the company.

Factors contributing to success or failure of the programs were numerous and diverse and often linked to the type of innovation that was tried. However, two areas stand out as being of major significance to the success of a project:

1. The personalities of managerial and supervisory personnel and the degree of commitment given to the project by them.
2. An environment permitting free expression of views and fostering open channels of communication.

The effects which were experienced from the projects fall into a number of clearly defined areas:

Improved job satisfaction and improved productivity, motivation, efficiency shared top mention. Improved communication and improved relations between labour, union, supervisory personnel and management followed. Reduced turnover, absenteeism and number of grievances were observed, as were improved service or product quality. Greater pride in work and higher employee earning through opportunities to learn new tasks were also noted. A variety of other effects applicable to the individual operations and prior conditions within an given company were enumerated by the respondents.

Both the problems encountered, as well as the primary reasons for success most often centered on attitudes of the individuals involved. Problems were particularly apparent with supervisors and employees who felt their status threatened or were comfortable in the existing structures and had difficulties

adjusting to innovations or greater responsibility.

It was difficult to determine whether unionization was perceived as constituting a positive or negative factor in relation to change. Union willingness to cooperate was cited as a contributing factor to success in some cases. In others, unions contributed to problems of implementation by creating suspicion or initial argument against incentive payments.

A primary reason for lack of opposition by unions can be explained by the joint union management approach to change. Most programs dealt with a combined job enrichment and productivity philosophy and nowhere was the labour force cut drastically or pressure made evident for increased output. Layoffs can be avoided in productivity programs in industry by strategies which focus on product cost, pricing and sales volume.

In the Labour Ministry's inventory of experiments with innovations summarized here, no in-put - out-put measurements were used to determine the degree of raised productivity or dollar value placed on reduced absenteeism, etc. Such measurements have been carried out elsewhere and their form depends on the individual experiment, the approach to productivity/quality of work life, and the type of innovation applied to whatever existing conditions prevailed. It is not useful for our purposes to record dollar savings documented by individual companies, but rather to learn that efforts to improve the quality of working life can affect production.

On the other hand, it has been shown that individual attitudes and motivations play a crucial role in any plan for improved productivity and work design. These attitudinal elements would be well to be considered in order to determine chances for successful implementation. At the basis would surely need to be an information and education resource to re-educate both management and labour representatives to emerging concepts to help overcome ideological barriers and practical resistance that might be expected. An information resource centre certainly is desirable for behavioural science experts to draw upon in order to integrate the experience in strategy and tactics of work redesign and quality of work life innovations. Monitoring and evaulating a program, once in place, would appear as the essential next step in order that its impacts may be measured or strategies adjusted.

Repeatedly, Canada is being reminded of its low productivity vis-a-vis other

industrial nations and the consequences this carries in respect to international trade. In light of this, can anyone - corporate and union leaders alike - doubt the growing necessity for action to increase productivity in the industrial sector?

Looking for Efficiency in the Public Sector

Incentives for increased productivity and quality of work life must come from within government and from union leaders. Even though one might expect public pressure towards that end, it has so far failed to materialize. One of the primary difficulties is the fact that no force analogous to the profit motive exists in the public sector which acts to hold down expenditures. From the viewpoint of the administrator, public sector outputs do not reflect goods and services produced, but rather costs of goods and services purchased. Individual administrators and bureaucracies have frequently measured success by their ability to obtain budget increases, an enlarged staff and an increased scope of activities. Traditionally, fiscal requirements escalate because of population increases, greater urbanization, rising affluence and higher levels of service, and expansion of government into new fields. It is therefore particularly important in times of fiscal restraints to be able to call on devices which monitor, measure and are able to suggest corrective action for more efficient and productive uses of existing resources.

Experience in the United States

The United States National Commission on Productivity was created in 1970 to develop recommendations and programs for improving the productivity of the economy and was composed of representatives from business, labour, government, and the public. It identified reasons for lagging productivity and pointed out areas for improvement. The rapid increase in the size of the public sector was seen as a possible factor for slowing overall productivity and it was concluded that means of improving productivity in private industry were also applicable to the public sector. A report to the Commission identifies two major problems: (a) that there is no consensus of what constitutes productivity measures, and (b) that political and administrative interest and will power are frequently lacking.[1] Despite this, the report makes recommendations for Commission

[1] H.P. Hatry & Donald M. Fisk, Improving Productivity and Productivity Measurement in Local Government, the Urban Institute, 1971.

action to help generate productivity. In December 1975 the Commission became the National Centre for Productivity and Quality of Working Life.

A statement on national policy by the Research and Policy Committee of the Committee for Economic Development identifies principal deficiencies and opportunities for improvement common to most state and local governments and suggests general approaches adaptable to particular circumstances.[1] Public opinion polls in the U.S. show that people feel they are not getting their tax dollars' worth; this gap between expectation and delivery defines public perception of productivity which is lower than it could be. The study shows that the number of state and local government employees increased by 150% between 1954 and 1974.[2] On the other hand, it found no evidence of increases in quality and quantity of public service.

Great disparities in performance levels exist from city to city and an absence of comparable performance data makes comparisons extremely difficult. The report measures productivity in an economic sense, i.e. the cost of goods and services which government produces for its citizens, and makes suggestions for improvement. However, productivity is defined not solely in terms of inputs/outputs, and four other areas are identified:

(1) Management;
(2) The work force;
(3) Use of technology and capital investment, and;
(4) measuring results and impact of government programs.

In order to motivate government to take measures towards productivity improvement, the CED recommended performance audits to be conducted by outside agencies, and that competition be introduced creating consumer choice, i.e. contracting out with either public agencies or private organzations for service. In addition, it called for pressure groups, e.g. business, political parties, educational institutions, to exert their influence on government for improved productivity. It recommended federal research, development assistance and state involvement in financing and technical assistance.

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[1] Improving Productivity in State & Local Government, CED, April, 1977, (3rd Printing)

[2] Ibid., p. 38

Approaches by local government to productivity can assume a hard-line cost-savings orientation or they may be experiments in motivational approaches to greater managerial effectiveness, worker participation in planning of efficient work flow, greater job satisfaction and productivity, most of which cannot readily be measured. Various cities in the United States have used a combination of approaches and their experience is well documented.

A review of eight U.S. jurisdictions (Dallas, Detroit, Milwaukee, Nassau County, New York, Phoenix, Tacoma and Palo Alto) indicates that impetus in seven of the eight cases came from an individual.[1] Productivity programs originated with the mayor in New York and Detroit, with the city manager in Dallas, Tacoma, and Palo Alto, and the executive assistant of the County executive influencing several municipalities of Nassau County, Long Island. In Phoenix, the city council as a whole was responsible for instigating a productivity program as a result of council's reluctance to increase taxes.

The lack of citizen group pressure indicates that citizens on the whole are not interested in productivity in local government and that a city manager type organization or chief executive concerned with efficiency and costs are most likely to play the leadership role in an overall program. In the case of New York, severe fiscal problems necessitated a stern look at expenditures and greater productivity of its existing resources. Acceptance by politicians is usually critical to a continuing program because inevitably, political issues are raised by the concept of productivity. Certain departments, such as police or fire departments, are particularly sensitive politically and may be considered "untouchable". It may also be necessary to exercise great diplomacy in introducing new measures to department heads who consider the operations of their respective departments as their private domain and are generally reluctant to submit to the scrutiny of efficiency or behavioural science experts. These considerations, plus a desire to point to early successes have frequently led to productivity improvement projects concentrating on technological innovations coupled with departmental reorganization.

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[1] Fredrick O.R. Hays, Productivity in Local Government, D.C. Heath and Co., 1977.

Others placed greater emphasis on fiscal planning and the motivational approach. Phoenix, for example, coupled technology with reorganization to realize fast results but set its goals primarily on increasing productivity over the long run by detailed analysis and budget planning, engaging outside consultants to determine the most effective approach to increasing productivity. The Nassau County program tried to involve the rank and file in program development by effective training and identification of key problems but failed to involve middle management, bringing about failure of the project. New York, under Mayor Lindsay, concentrated on analytical expertise but its emphasis under the next administration shifted to a joint union-management approach which emphasized union power. The analytical expertise and critical approach to departmental performance suffered when the original approach was followed by a more selective one with greater sensitivity to department and union objectives raising the dilemma of achieving balance between efficiency and democracy.

Case studies on hard-line cost-savings programs have shown that most improvements in productivity can be realized at the outset after which further improvements are difficult to achieve.[1] When increased productivity was recorded, it could not be attributed to worker motivation to perform according to work standards alone, since technological improvements played a major role. Furthermore, embarking upon a program was not cheap and worker productivity improved significantly only where it involved sharing of benefits, i.e. bonuses or extra pay.

One of the difficulties is measuring performance in activities lacking tangible output or gauging the time required for carrying out specific tasks, with the result that work standards might have to be set at fairly low levels. Setting of work standards and performance measurement involves planning and scheduling of work which combines good management with worker productivity.

Job satisfaction in these experiments showed an initial drop in two of the five cities whose projects were monitored but generally increased job satisfaction in the long run. All projects faced initial resistance but employee participation in decision-making facilitated the introduction of programs.

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[1] John M. Greiner, et al, Monetary Incentives and Work Standards in Five Cities: Impacts and Implications for Management and Labour, The Urban Institute, April, 1977.

In summary, these experiments show that United States local governments have been concerned with productivity and with effecting cost savings. Their programs have concentrated primarily upon clearly visible input/output operations where use of improved technology and reorganized work flow can show considerable savings. The impetus for placing productivity programs into effect rested with a top level executive, and there has been no evidence of citizen pressure for improved performance even though public perception indicated dissatisfaction with levels of performance. It is also evident that middle management's cooperation is not always easy to secure. It is critical to the success of any program. At the same time, analytical expertise, be it in-house or on an outside consultant basis is vital and must have management and council support. The political environment of a particular city plays an important part and varies from city to city which in turn affects the potential for success of a program.

Unions in the Public Service in the U.S. vary in strength and have been able to hinder progress in productivity programs in certain cities. On the whole their impact has not been detrimental to change when they have been involved in joint union/management decision-making.

Some Canadian Efforts

Municipalities have been left to cope with the subject of financial restraint and provincial cut-backs after their own fashion, which all too often is taking the least troublesome routes, that of raising taxes or cutting services. Development of a third alternative entails incorporating into the administrative budgeting and managerial development process the long-term objectives of productivity and quality of working life goals.

Productivity and quality of work life enter into the budget review process and into personnel and management functions. To what extent these concepts are recognized within these functions seems to depend upon the individual municipality or department head. No one source appears to exist which is familiar with current experiments in various Canadian municipalities, nor has there been any documentation of experiments.

Toronto's Management Services Department was established in 1975 to aid management in the performance of its functions and has made available a resource body of experts to deal with a broad range of policy concerns including

organizational questions and quality of working life concepts. Its budget control system which includes a computerized system of current expenditures makes detailed analysis of budget allocations possible and greatly facilitates control over spending. While some departments have made good use of the in-house expertise provided by Management Services, others feel that the budget process and their own internal operations conducted in the interest of efficiency are better. Quality of working life as yet seems a hazy notion to some.

Toronto's Management Services Department has no formal link with other municipalities who may be pursuing similar aims. It is also only marginally concerned with measuring and/or monitoring individual innovative programs which have been put into effect within the City's administrative system.

The Regional Municipality of Ottawa-Carleton has also established a management service department. It measures existing productivity as a starting point to the concept of productivity and quality of working life improvement. Two programs dealing with measuring output and evaluation are in place. A maintenance management system deals with standards and levels of services provided to the public. Performance measurement for all departments is the second, and is concerned with general efficiency, effectiveness of programs and output, as well as employee responsibility, accountability, individual performance and job enrichment. Ottawa-Carleton also plans to carry out fairly extensive training at the managerial and supervisory levels in order to overcome selective bias.

The City of Windsor has had a Productivity Committee for the past eighteen months, consisting of department heads and Commissioners. The Committee has been attempting to gather information on the subject from the U.S. and Canada and has contacted the Ministry of Intergovernmental Affairs regarding ideas for generating interest and information on productivity. A suggestion for the inclusion of a regular digest of productivity projects in the Ministry's information bulletin "Background" and actively generating interest on this topic was not favourably received, beyond the usual willingness to publish information. The City of Windsor has embarked upon a number of individual cost savings innovations such as computer analysis of fire stations and equipment, experiments with solid waste collection and composting operations which have effected staff reductions and staff efficiency by reorganized work flow and use

of modern equipment. A suggestion system encourages employees to come forward with innovative ideas affecting service, safety and productivity. The City Clerk's Department has experimented with job rotation for employees for a number of years to make their work more varied and interesting. The staff of 28 now performs work other than their regular job for three months out of twelve. Greater job satisfaction and suggestions for improvement in carrying out tasks have been observed, resulting in improved productivity. The Clerk would like to see flex time approved for use throughout the City departments. Another innovative program that is being recommended for discussion at the next bargaining session with the unions concerns full-time versus part-time work for clerical and secretarial employees of the Department. It has been determined that staff would prefer to work on a permanent part-time basis in order to better combine working life with demands of child-raising and homemaking. Windsor has demonstrated its commitment to cost savings innovations and concern for quality of working life by approaches to productivity in the Clerk's department.

Yet another example of innovations in work organization and productivity programs is provided by Sudbury. Sudbury has followed the lead of the City's primary industrial employer, INCO, in paying employees for innovative ideas which improve productivity. The City has paid large bonuses to several people who have devised technologically innovative ideas. A management assistance group composed of an interdepartmental committee disseminates information and provides impetus for experimentation. For the past four years productivity in various selected departments has been measured and monitored by a program which was developed internally and rewards employees by means of a bonus system. Personnel has been reduced by attrition without evidence of reduced output. Its next project is a control system in building inspections in order to set standards and measures for productivity. In its approach to productivity along cost-savings lines, the municipality feels that no difficulties have been encountered with the unions because channels of communications are kept open and innovative changes go through the process of joint negotiations.

Other programs in various municipalities across the country exist, but their existence is nowhere systematically documented and therefore only vaguely known in municipal circles. Unlike developments in the U.S., where state and local governments were introduced to the concept of productivity by a federally initiated program -- the U.S. National Commission on Productivty

which evolved into the National Centre for Productivity and Quality of Working Life, all three levels of government in Canada have been dealing with the concept on their own. While strides are being made into diverse directions concerning approach and are at varying levels of evolving, municipalities seem to lag further behind because they have been experimenting individually and without the aid of an adequate data base. Undoubtedly, their individual efforts are valid but they could benefit from a general framework which would make comparative analysis and exchange of experience among themselves part of the process.

Historically, industry has passed on innovations to the public sector and Canada has had the opportunity to learn from the urban experience in the United States.

Although it is recognized that the intergovernmental hierarchy and municipal structures differ in certain respects between U.S. and Canadian municipalities the latter have the benefit of examples of experience to draw upon. It is evident that philosophical approaches to productivity and quality of working life are multifaceted and bear specific impact according to their application by municipalities. It has also been determined that measuring productivity is an important aspect but simultaneously presents a thorny problem. Even when approaches do not take a hard-line cost-savings orientation, means of gauging innovative programs are needed.

Programs in both the private and public sectors which have been undertaken in Canada provide lessons. The distinction between government and private enterprise is clear, but the need to restrain spending is just as urgent in governmental operations as it is in business. Because of the nature of government's labour intensive structure, productivity and quality of working life questions are even more applicable to the public sphere. Some of the groundwork in information gathering pertaining to the experience in the private sector in Ontario is being laid by Ontario's Quality of Work Life Centre. What is needed is that this work be extended into the public sphere. Federal, provincial and municipal jurisdictions are at present dealing with the concept in isolation and results of their work are not disseminated by any resource group concerned with public sector productivity and quality of working life.

Experience in the private sector in Canada and in the public sphere in the U.S. have shown that initiative and motivation are a major factor to the success or failure of any innovative program. Unless individual administrators or politicians within municipal corporations show specific interest in working with productivity and quality of working life questions, neither the public nor any other body is ready to question their lack of interest or activity in that area.

XI BEST OPPORTUNITIES FOR COST SAVING INNOVATIONS

Our examination of cost saving innovations has provided valuable insight into which areas of municipal operations offer the best opportunities for relatively easy and substantial savings. These generalized observations should be weighed carefully against local conditions and used only as a guide to possible action. The criteria for selecting the best opportunities for savings are primarily those most frequently mentioned as well as those innovations that produced the highest reported dollar savings.

The starting point for our examination of areas best suited for consideration as cost saving innovations will be the checklist of innovations submitted in Phase I of our project. The highest to lowest numbers of innovations submitted by municipal department, were as follows:

public works	56 innovations
general administration	25 innovations
finance	22 innovations
public safety	19 innovations
transportation	16 innovations
parks, recreation & libraries	13 innovations
community & social services	8 innovations
economic development	1 innovation

Public Works

As was mentioned in our Phase I report, the large number of cost savings ideas in public works departments reflects the ability to quantify and evaluate hard services, whereas soft services are much more difficult to measure. Accordingly, we find many innovations related to equipment improvement and systems developed to improve the delivery of services.

General Administration and Finance

The next two categories with high levels of innovation are general administration and finance. Here we find the obvious problem of information retrieval and evaluation. Municipalities are continually generating data on public finance, assessment, and other areas of public records. This ever increasing volume of data requires new systems and techniques utilizing newly

developed computer hardware and software. Therefore, a majority of the innovations in these two areas deal with computers or related information technology such as word processing equipment.

Public Safety

Public safety is a prime candidate for innovation for reasons other than public works, general administration, or finance. While there have been many technological breakthroughs for both police and fire departments in terms of new equipment, there has been little change over the years in general operating procedure. Therefore, while several innovations in the area of public safety deal with equipment modification, others have been concerned with changes in fairly archaic management and operating systems. While innovations in the public safety area are still very much in the area of equipment improvement, these initial breakthroughs are most welcome. Municipalities will have to be extremely cautious when considering innovations in the public safety sector because there is strong public support for maintenance of the status quo in this area.

Transportation

Transportation, as the next most mentioned area for innovations, has been subject to the ever growing influence of the computer. Several of the innovations submitted in this area were related to computorized route selection or similar technological developments. Reserved bus lanes, mini buses, and other such efforts to improve the general service level were also high priority innovations in the transportation category.

Parks, Recreation and Libraries

Parks, recreation and libraries did not have many significant innovations proposed, especially in terms of the dollar savings that were projected. One area that warrants special attention is the increasing use of volunteers and community groups as a means of providing certain services in these categories.

Community and Social Services

Community and social services innovations were primarily in the area of computerized records management with some attention given to service delivery.

In summary, we cannot generalize from our experience that certain labour intensive activities offer the greatest opportunities for cost saving innovations. Rather our evidence indicates that innovation occurs across a wide spectrum with certain obvious opportunities in the areas of garbage collection, computerization, word processing, and fire protection. Once again, we should caution that these observations are based on a somewhat limited sample and should be used only as a guide for initial consideration by any municipality. Also, it would be advisable for any municipality to go through the entire list of innovations submitted in Phase I of our project, and undertake some manner of operational evaluation in order that the whole municipal function be given a thorough and comprehensive review.

XII CHECKLIST FOR ENCOURAGING INNOVATION AT THE LOCAL LEVEL

It is fairly obvious from our case studies and public employee interviews that certain factors are consistently present and necessary to ensure the successful implementation of a cost saving innovation. This does not mean that an innovation cannot be implemented without each of these factors present. This does not imply that all the factors are not important, but rather that most municipalities have not been involved in many comprehensive cost savings programs or operational reviews. Most change has occurred incrementally and been easier to implement than the dramatic innovation programs being touted in this and similar reports. However, as municipalities increase the level of their involvement in the review and adjustment of service provision, their overall sophistication will increase. Levels of expectation will rise proportionately, thus creating a much greater need to have all necessary factors for success well in place. Also, as the easier and more popular innovations are implemented, further savings will only be possible if a much wider range of innovations is considered. These innovations will be more difficult to accomplish either because they attack a very strongly entrenched municipal operation or require the expenditure of public funds as a prerequisite to putting new technology or procedures in place.

Thus, as the task of identifying and implementing cost savings in the future becomes more sophisticated, as well as more difficult, the presence of these factors will be much more necessary than is currently the case, and while these are presented as a guide for consideration by municipal politicians and administrators, it is not intended that they be viewed as a complete checklist applicable to each municipality. Factors vary from one community to another and care should be taken in the application of the items mentioned below.

1) High Calibre Municipal Administrator - Without question the main ingredient instrumental in the encouragement of innovation at the municipal level is the presence of an intelligent, progressive Chief Administrative Officer. In some municipalities, this individual may be called a City Manager or have some other title, but is always in the position of providing leadership for the civic department heads. The fact that many municipalities have no such administrative leader is seen by many observers as one of the main reasons why more innovations are not being implemented.

2) Cooperative Unions and Employees - Almost every conceivable innovation requires a high degree of involvement and cooperation from municipal employees. Employees need to be involved at every step in the innovative process and be given the maximum opportunity to benefit from the various innovations to be implemented. Goals established for each innovation should give equal weight to employee satisfaction and safety, in conjunction with the maintenance of high service level standards and improved cost benefit.

3) Aware Politicians - In the final analysis most decisions to change the basic operation of a municipality will involve a number of actions by the political governing body. Without their complete understanding and cooperation many ideas may be stalled or laid aside. Politicians should be informed as early as possible of internal efforts to bring innovations on stream. In this way, they can establish policies and legislation to facilitate these innovations and take their appropriate credit for their implementation. In many instances a particularly involved municipal councillor may take the lead in encouraging new ideas and can be extremely helpful if such efforts are seen as positive and constructive by administration and employees.

4) Operational Review and Evaluation - Some innovations have occurred within the framework of an overall review of municipal operations, while others came about on an ad hoc basis. It stands to reason that the former approach produces not only the highest priority for changes but also the best evidence to support what might be fairly costly innovations. In many instances it will take some expenditures to accomplish both short and long term savings. Without thorough evaluation data and accurate estimates on the impact of proposed innovations, many ideas may not gain necessary public or political support.

5) Exposure to Ideas - While many operational changes will evolve quite naturally from periodic review and analysis, some problems may not have obvious solutions. The fact that other municipalities may have experienced similar problems and solved them successfully can only be an advantage to other communities if this information is shared and readily available to administrators, politicians and employees. Cost saving innovations can be obtained in magazines, conferences, and

personal visits to other communities. These information sources must be reviewed carefully and when it is well established that the information is worthwhile, all those involved in the work of the municipality should be encouraged to avail themselves of the information.

6) A Change in Attitude - Each of the foregoing suggestions will help to establish the last and final ingredient essential to any effort at bringing forward more cost saving innovations. This ingredient is a change in the basic attitude of the municipal entity towards change. Instead of fearing and resisting change, a municipality must begin to feel comfortable with constructive internal criticism and the pursuit of a better way of providing municipal services. Protecting methods and procedures which are outdated and inefficient and can only lead to the eventual embarrassment of employees, administrators, and politicians who cling to the past and the status quo.

XIII SUMMARY AND RECOMMENDATIONS

It is extremely encouraging to witness Canadian local Governments as they begin to undertake serious experiments aimed at dramatically improving the cost effectiveness of service delivery. Many scattered cost saving innovations were recognized in the first Phase of our study and now we are beginning to see a few municipalities adopting an innovative and businesslike approach to the full range of their operations.

The case studies featured in this report confirmed many previously held assumptions including the following:

1) Most innovations originate in the civic administration as opposed to the political arena with service improvement a fairly equal goal to that of cost reduction.
2) Most innovations need to be carefully planned and implemented over several months even years to minimize resistance from employees, department heads, politicians, and the general public.
3) Employees seem to be the key ingredient in determining the ultimate success or failure of any cost saving innovation.
4) Quoted figures of actual cost savings seem to be legitimate but can not usually be confirmed by systematically gathered and tested data. Only one of our five case studies could classify as a legitimate controlled experiment.
(5) There is still no satisfactory mechanism for transferring information on cost saving innovations between Canadian local governments.

Information gleaned from non case study sources clarified and strengthened certain assumptions dealing with the involvement of employees in efforts aimed at improving cost effectiveness or productivity. The main one of these assumptions says that quality of working conditions must be considered hand in hand with productivity in order to gain employee co-operation. Without this co-operation many worthwhile projects could be delayed or completely abandoned with a resulting unnecessary increase in service cost and decrease in the quality of service delivery.

environment crucial

Other factors were identified that can have a dramatic bearing on the ability of any community to implement various cost saving innovations:

1) A highly qualified Chief Administrative Officer is one of the most important criteria since innovation is encouraged by strong confident leaders.
2) Involved and informed elected officials can muster public support for change and pass laws that insure equity and longevity for necessary reforms.
3) Continious review and evaluation of services and programs can produce vital information necessary for the successful operation of any business or governmental agency. Zero based budgets, performance audits, and citizen surveys are just a few of the information tools now available to municipalities.
4) Constant exposure to new ideas through magazines, conferences, and visitations will help to keep a vibrant and flexible attitude alive in the municipal sector. Without this exposure municipalities will again become myopic and less able to retain an adequate level of objectivity.
5) Each of the above items along with employee co-operation can bring about a basic attitudinal change which fosters and encourages change instead of resisting it.

A number of specific recommendations result from these observations and should be pursued:

(1) Throughout our study we have continued to use the phrase "Cost Saving Innovations" to identify all those technological and management improvements that have helped local governments to improve their operations. However this may be a confusing or misleading phrase for some people who view many progressive changes in terms of improvement in the quality or level of service and not perhaps in purely financial terms. Therefore, future studies or programs should perhaps use the phrase "municipal innovations" in order to clarify or improve this situation.

(2) There is sufficient evidence to support the establishment of an ongoing system for sharing municipal innovations between Canadian municipalities. Existing conferences, agencies,and publications are distributing much valuable

information, however there is a need to emphasize the practical innovations that can help municipalities deal with their operating problems. This emphasis will help municipal officials focus on the positive aspects of implementing innovative programs and perhaps minimize the fear that would restrict many opportunities for change. There are at least two options available regarding the establishment of such a network:

a) Obviously a national network for municipalities could be set up by a national organization. Two possibilities would be the Federation of Canadian Municipalities or the Intergovernmental Committee on Urban and Regional Research. Both organizations now distribute information between municipalities. This information, however, almost exclusively deals with formally prepared reports. The gathering and dissemination of municipal innovations involves cataloguing many programs or ideas that have not been evaluated. Nevertheless the transfer of these ideas can be very beneficial to municipalities and warrants consideration on the part of these two groups.

b) A second alternative to using a national organization and approach could be a combined effort by an organization involved in municipal affairs,such as the Bureau, and Municipal World. The organization could act as the agency responsible for gathering information which would come from provincial-municipal associations, direct questionaires and other groups. Municipal World could then establish a special section in the magazine for municipal innovations.

The first proposal (a) could utilize either a user charge system or be subsidized by government agencies while the second (b) proposal would probably prohibit the user charge approach.

(3) Even without taking action on the recommendations (2a) or (2b) there can be positive action to improve the information on municipal innovations now being distributed to Canadian cities. Very few Canadian municipalities are taking advantage of the information sharing system now in operation through the International City Management Association. The quarterly publication entitled Guide is now being distributed to nearly 1600 North American cities with only 67 Canadian cities included in this group. Much more should be done to publicize the availability of the Guide which documents about 300 innovations

per year with an annual charge of $25.00. Further information can be obtained from the International City Management Association, 1140 Connecticut Avenue, N.W., Washington, D.C. 20036.

(4) The Bureau, in co-operation with the Ontario Ministry of Intergovernmental Affairs, has held a series of seminars to bring more attention to several of the innovations implemented in Ontario. These seminars seem to have been very helpful to those who attended and should be continued in the future. Other provinces, perhaps through municipal associations should be advised of this approach for spreading municipal innovations. Three or four seminars per year in different geographical locations with registration fees to cover costs would appear to be the most logical approach.

(5) One of the serious problems identified by this study was the inability or at least current unwillingness of municipalities to set up proper evaluation procedures for the innovations they implement. The Province should produce a guide for municipalities to follow in gathering and evaluating information related to municipal innovations. This will not only allow for more thorough evaluation of each innovation but will also lend much needed credibility to claims of cost savings. More municipalities may then see their way clear to implementing more of the innovations identified.

(6) Another method of validating the results of innovative municipal projects is to send study teams to investigate and report their findings. This approach allows for independent observation and evaluation and should be done in conjuction with evaluation process mentioned in (5) above. Five or ten per year could be undertaken using the format established by the International City Management Association whereby a team of three (one elected, one appointed, one I.C.M.A. staff) visit a city for one to two weeks. Fact gathering and interviews take place with a 10-20 page report being prepared which indicated why an innovation was undertaken, the implementation procedure, how it is working and how much money is actually saved.

(7) The predominant factor influencing the likelihood that innovations will be implemented is the presence of progressive management. Most cities in Ontario do not have a City Manager or CAO and therefore often lack central guidance for the introduction of technological or management improvements. Encouragement and

and direction from top management is instrumental in the development of progressive staff attitudes which lead to innovations. A full scale study should be commissioned by the Provincial government to examine the management capabilities of Ontario's municipalities with specific emphasis on the advantages and disadvantages of various management styles. Hiring practises should be reviewed and guidelines established for the proper selection of various key management personnel. Current practises regarding renumeration and incentives for progressive management need to be examined with some definite ideas or programs that will likely improve the quality of management in Ontario municipalities. These findings should be widely publicized to other provinces in the hope that the recommendations will be adopted beyond Ontario's boundaries.

EXHIBITS

EXHIBIT I

COST SAVING INNOVATIONS IN LOCAL GOVERNMENT

QUESTIONNAIRE USED FOR INTERVIEWS

NAME: _____ DATE: _____

POSITION: _____

1. When was this innovation on _____ originally conceived?
   Month: _____ Year: _____
2. Who proposed the innovation? (Person and Position) _____
3. What was the main reason this innovation was suggested? _____
   _____
   _____
   _____
4. Where did the idea come from?
   (a) department analysis
   (b) employee suggestion
   (c) professional magazine
   (d) another city
   (e) politician
   (f) other
5. How many months did it take to plan? _____ Implement? _____
6. Was implementation delayed? _____ How many months? _____
   Why? (a) upcoming election
   (b) high cost
   (d) union resistance
   (e) public pressure
   (e) poor planning
   (f) political/admin. disagreement
   (g) other
7. How was this innvoation introduced to major interest groups?
   (a) Citizens: _____
   _____
   (b) Employees: _____
   _____
8. Were there major problems encountered during planning or implementation?
   Yes No
   (a) If yes, please explain: _____
   _____
   _____
   _____

(b) What steps were taken to alleviate these problems?
   (i) PR Campaign
   (ii) mediation
   (iii) fund raising effort
   (iv) task force or committee formed
   (v) pilot project initiated
   (vi) consultants hired
   (vii) other
9. Was there a step by step implementation process for this innovation?
   Yes No
   If yes, please explain: _____
   _____
   _____
   _____
10. What was the intended and actual impact on the quality and level of service?

	Intended	Actual
(a) very positive	_____	_____
(b) positive	_____	_____
(c) no change	_____	_____
(d) negative	_____	_____
(e) very negative	_____	_____

11. Were there surveys and/or studies done to measure client or citizen opinion on quality of service?
   Yes No
   If yes, who did them and what was the basic finding?
   (a) Before: _____
   _____
   (b) During: _____
   _____
   (c) After: _____
   _____
12. What was the intended and actual impact of this innovation on the efficiency of the service (cost per unit or per capita:)

	Intended	Actual
(a) much higher	_____	_____
(b) higher	_____	_____
(c) same	_____	_____
(d) lower	_____	_____
(e) much lower	_____	_____

13. What techniques were used in determining efficiency ratio? _____

14. Did the savings occur as:

	Yes	No	Amount
(a) actual cost reductions			_____
(b) projected cost reductions			_____
(c) avoidance of cost increase			_____

15. What is your estimation of the start-up cost for this innovation?
    (a) new equipment _____
    (b) retraining of employees _____
    (c) new records system _____
    (d) maintaining unnecessary equipment _____
    (e) maintaining unnecessary employees _____
    (f) other _____

16. Are certain start-up costs avoidable by other municipalities due to the trial nature of your project?
    Yes No
    Why? _____

17. Were any start-up or operational costs paid by another level of government?
    Yes No
    Please explain briefly: _____

18. Would you say that employee moral and job satisfaction changed as a result of this project?
    Yes No
    If yes, would you say the change was:
    (a) greatly improved _____
    (b) improved _____
    (c) no change _____
    (d) worse _____
    (e) much worse _____

19. Various indicators can be used to determine the changes in staff attitude. Since this innovation was implemented, what has happened in the following areas?

	Increase	The Same	Decreased
(a) absenteeism	_____	_____	_____
(b) injuries	_____	_____	_____
(c) discriplinary action	_____	_____	_____
(d) tardiness	_____	_____	_____
(e) grievances	_____	_____	_____
(f) strikes	_____	_____	_____
(g) work stoppages	_____	_____	_____

20. While numbers of various incidents give an indication that labour-managementrelations may have changed, they are sometimes not as important as the nature of strikes, grievances, etc., that are occuring.
    In this regard, do you feel the overall health of labour-management relations has:
    (a) greatly improved _____
    (b) improved _____
    (c) stayed the same _____
    (d) become worse _____
    (e) become much worse _____
    What is the basis for your opinion? _____

21. Is this particular innovation still in effect? Yes No
22. If yes to question 21, is it likely to stay in effect in the future?
    Yes No
23. If no to questions 21 and 22, why not? _____
24. Have the procedures or systems implemented with this innovation been transferred to any other department or agency in your municipality?
25. Were you in favour of the project at its inception? Yes No

26. What convinced you to feel the way you did? List factors in order of importance:

(a) _____
(b) _____
(c) _____
(d) _____

27. Did you change your mind at any time concerning your support for the innovation:

Yes No When? _____

Why? _____

_____

_____

28. What have been the major advantages and disadvantages coming out of this project? Please list:

_____

_____

_____

_____

_____

_____

_____

EXHIBIT II

Windsor Case Study
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2. Coulter, Walter, Project Director for the trial, July 24, 1979
3. McConnell, Ron, Assistant to the Project Director for the trial, July 24/79
4. Payne, Hilary G., Commissioner of Public jWorks during first quarter of trial, August 14, 1979
5. Warner, Mickey, President of CUPE Local 82 during latter part of trial, July 24, 1979
6. Weeks, Bert., Mayor of Windsor duringtrial, July 24, 1979
7. Wilkin, John, Director of Operations, Dept. of Public Works during trial, July 24, 1979.

Winnipeg Case Study

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Inter-Office Memorandum To: Councellor P.A. Rizzuto, Chairman of Sub-Committeeof Energy & Environment from Mr. H. Haak, Manager of Civic Properties Operations 01/25/1979

Interviews

1. Mr. Daque, Winnipeg City Administrator
2. Mr. Henry Haack, Manager of Operations Branch Civic Properties
3. Mr. Hume Young, Director of Civic Properties
4. Mr. Ogelski, Superintendent of Crime Prevention, Winnipeg Police Department
5. Mr. Russell Phillips, Operator & Supervisor of "JC80" in Central Control Room, Civic Properties.

Quebec Case Studies

Interviews

Cyrille Mainguy - Director of Fire Services - City of Quebec
Jacques Perreault - City Manager - City of Quebec
Deputy Fire Chief
Junior Employee of Association of Canadian Life Assurance Companies

Metropolitan Toronto Case Studies

Interviews

William Annand - Superintendent Metro Maintenance Yard.
Arnet Curtis - Superintendent Division I, Metro Roads.
Thomas Johnson - Deputy Commissioner Metro Roads Dept.
Driver of Bridge Crane Truck.

City of Toronto Case Studies

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Interviews

L.S. Berney - Executive Director of Operations, Toronto, Transit Commission.
Michael Warren - General Manager, Toronto Transit Commission.

Exhibit III

QUEBEC CITY

RESPONSE TIME BY STATION

	1	* 2	3	4	* 5		8	10	11	12	13	14
1974	3.5	5.6	2.9	9.2	3	3.8	3.2	3.5	3.7	3.0	4.0	3.8
1975	2.7	6.4	3.4	9	3.9	3.7	3.3	3.0	4.2	3.4	3.3	3.7
1979	2.9	6	3.5	8.7	-	3.8	3.8	3.5	3.9	2.9	4.1	4.2

*7 Juillet 1978

Closing station No. 3 at 420, rue Dorchester Sud.

Closing station No. 5 at 105 rue Dalhousie.

Opening of new station No. 3, at 19 rue St-Nicolas.

Exhibit III

QUEBEC CITY

FIRE DEPARTMENT STATISTICS

COMPARING CERTAIN YEARS 1965-1978

Year	Fire-Fighters	Stations	Budget	Property Loss	Loss Per Capita	Fire Dept % of City Budget
1965	483	13	$ 2,987,880.	$ 2,591,529.	$ 9.2	-
1968	460	10	3,843,982.	1,768,851.	10.68	-
1971	423	11	5,521,423.	4,069,159.	21.66	12.13%
1972	427	11	6,047,739.	2,164,442.	11.52	11.93%
1973	414	11	6,570,606.	3,244,272.	17.27	10.77%
1974	407	11	6,905,247.	4,828,024.	25.70	10.48%
1975	401	11	8,018,698.	3,628,230.	19.31	10.07%
1976	390	11	9,264,860.	7,922,289.	42.17	10.27%
1977	377	11	9,411,098.	2,581,389.	14.57	9.46%
1978	362	10	10,113,694.	5,369,452.	30.31	9.86%

CORPORATION

Algoma Central Railway
Allstate Insurance of Canada
Bank of Montreal
Bank of Nova Scotia
Bell Canada
Board of Trade, Metro Toronto
Brascan Limited
British American Bank Note Co. Limited
Cadillac Fairview Corporation Limited
Canada Malting Company Limited
Canada Packers Foundation
Canada Permanent Trust Company
Canadian Imperial Bank of Commerce
Canadian Tire Corporation Limited
Confederation Life Insurance Company
Consumers' Gas Company
Consumers Glass Company Limited
Costain Limited
Crown Life Insurance Company
Davis & Henderson Limited
Dofasco Ltd.
Donlee Manufacturing Industries Ltd.
Dominion of Canada General Insurance Company
Eastern Construction Co. Ltd.
General Mills Canada Ltd.
Greater Canada Corporation S.A.
Group R
Guaranty Trust Company of Canada
Guardian Insurance Company of Canada
Gulf Realty Co. Ltd.
H.U.D.A.C. (Ontario)
I.B.M. Canada Ltd.
The Imperial Life Assurance Co. of Canada
Independent Order of Foresters
Jackman Foundation
Kodak Canada Ltd.
John Labatt Limited
A.E. LePage Limited
Lever Brothers Limited
Maclean-Hunter Limited
Manufacturers Life Insurance Co.
Maple Leaf Mills Limited
Marathon Realty Company Ltd.
L.J. McGuinness and Co,. Ltd.
McLean Foundation
McLeod, Young, Weir Limited
Midland Doherty Limited
Misener Properties Ltd.
Molson Companies
The National Life Assurance Company of Canada
Noranda Mines Limited
North American Life Assurance Co.
Northern & Central Gas Corporation Limited
Northern Telecom
Olympia & York Developments Limited
The Oshawa Group Limited
Parking Authority of Toronto
Rio Algom Limited
The Royal Bank of Canada
Royal Insurance Company of Canada
Royal Trustco Limited
Shaw Industries Limited
Sheraton Centre
Simpson-Sears Limited
Southam Inc.
The Steel Company of Canada, Limited
Sunoco Inc.
Texaco Canada Inc.
The Toronto-Dominion Bank
3M Canada Limited
Toronto Star Ltd.
Trans Canada Pipelines Limited
Travelers Canada
Turner and Porter Funeral Directors Ltd.
Union Gas Limited
Valleydene Corporation Limited
Victoria & Grey Trust Co.
Hiram Walker & Sons Limited
George Weston Limited
Wood Gundy Limited
Xerox of Canada Limited

PROFESSIONAL

H.H. Angus & Assoc. Ltd.
Ernest Annau, Architect
Armstrong & Molesworth
Arthur Andersen & Company
Bird & Hale Ltd.
John Bousfield Associates
Costa, Thurley, McCalden and Palmer
Currie, Coopers & Lybrand Ltd.
Deacon (F.H.) Hodgeson Inc.
Del Can
Development Engineering (London) Ltd.
M.M. Dillon Limited
Govan, Kaminker, Architects and Planners
Eric Hardy Consulting Ltd.
I.B.I. Group
Jarrett, Goold & Elliott
Judicial Valuation Co.
Marshall, Macklin and Monaghan
Russell J. Morrison
Norman Pearson, Planning Consultant
Osler, Hoskin and Harcourt
Peat, Marwick and Partners
Price Waterhouse & Co.
Proctor and Redfern Group
P.S. Ross & Partners
Smith, Auld & Associates
Stamm Economic Research Associates
Weir and Foulds

GOVERNMENTAL

City of Chatham
Canada Mortgage and Housing Corporation
Regional Municipality of Durham
Borough of Etobicoke
Etobicoke Board of Education
Township of Gloucester
City of Hamilton
Regional Municipality of Hamilton-Wentworth
City of London
Metropolitan Toronto
Metropolitan Toronto Separate School Board
Ministry of Intergovernmental Affairs
City of Mississauga
Township of Nepean
Regional Municipality of Niagara
City of North York
City of Oshawa
City of Ottawa
Regional Municipality of Ottawa/Carleton
Regional Municipality of Peel
Town of Richmond Hill
City of St. Catharines
City of Sarnia
City of Sudbury
City of Toronto
Toronto Board of Education
Town of Vaughan
City of Windsor
Borough of York
Regional Municipality of York

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Sudbury and District Labour Council

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