THE UNIVERSITY OF MANITOBA

THE EFFECTS OF EXPENDITURES, VOLUNTEER ADMINISTRATORS, AND MEMBERSHIP ON THE ATTAINMENT OF ELITE ATHLETIC STATUS IN MANITOBA: AN EXPLORATORY ANALYSIS

by

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Abstract

This thesis quantitatively investigated the cumulative and independent effects that expenditures for elite development, membership, expenditures for salary and administrative costs of professional administrators, and volunteer administrators had on the number of elite athletes in Manitoba. A sub - problem addressed the issue of whether or not potential problem areas existed on the information delivery systems of the sport associations in Manitoba.

The analytical technique employed was multiple linear regression coupled with bivariate dummy variables to test the null hypotheses. Eleven Manitoba sport associations were selected for this study.

Results indicated that from 1983 to 1987, expenditures for elite development, volunteer administrators, and membership were significant predictors of the number of elite athletes. Expenditures for salary and administrative costs were inconclusively related to the number of elite athletes produced by the sport associations. Dummy variable analysis indicated that speed skating did the best job of producing elite athletes from the available resources. The remaining sports were either average or below average in the production of elite athletes. Based on these results, it was concluded that three of the four regressors were significant predictors of elite athletic attainment. In addition, regression analysis with intercept shifting dummy variables could be used in sport research. Further, four areas of concern regarding the sub - problem of this study were outlined and recommendations for future research were presented.

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Chapter One

Introduction

Over the last twenty years, sport administrators have been subjected to increased pressure to satisfy the needs of the elite and the recreational athlete. The problem lies in deciding how the available resources (human and financial) are to be shared between the relatively few high performance athletes and the multitude of recreational athletes. Participation enthusiasts argue that increased involvement in sport would lead to an increased number of elite athletes. This belief follows from Pierre de Coubertin's law that states for every 100 participants, fifty will become high performance athletes, twenty of those will excel further, and finally, five will go on to the world class level (Buggel, 1984).

Realization of the funding allocation problem reached a climax with Canada's poor showing in the 1972 Olympic Games. Through technological improvements in mass media communications, international athletic performances were made instantly available to the general population of both the home team and the rest of the world. With this enhanced media coverage, international athletic performances had become a matter of national pride. The result was increased financial commitment by the federal government to elite development and mass participation to bolster Canada's standings in the international sport community (Macintosh, 1985).

With the introduction of millions of dollars into sport participation programs and elite development programs, Canadian athletes demonstrated substantial improvement at the 1976 Olympic Games in Montreal and the 1978 Commonwealth Games in Edmonton.

However, in order to continue the tremendous growth rate of elite development, it was believed that volunteer administrators would have to be replaced with better trained professional administrators (Campagnolo, 1978). Volunteers were not considered capable of meeting the complex needs of today's sport associations.

Several factors have been shown to be important in the development of elite athletes. Taylor (1976) and Zilberman (1985) stated that expenditures for elite development programs have led to improved performances by Canadian athletes in international competition. Campagnolo (1978) and Jackson (1981) believed that the hiring of full-time professional administrators has been responsible for improved performances by Canadian athletes. Volunteers in administrative roles has been associated with improvements in elite athletic performances by Conners and Callaghan (1982), while Zilberman (1985) and Buggel (1984) indicated that the way to produce elite athletes was to increase participation. The above studies, however, did not make use of statistical techniques to derive their conclusions. In addition, no research has been completed that assessed the cumulative effect of these factors on the attainment of elite athletic status.

Statement of the Problem

The main problem this study examined was the cumulative and independent effect of volunteer administrators, membership, and expenditure for administration and expenditure for elite development on the number of elite athletes in Manitoba. A sub-problem of this study was to highlight any current or potential problem areas in the

information monitoring and gathering mechanisms of the individual sport associations.

Hypothesis

The three hypotheses tested ($p > .10$) were:

1) The independent variables: expenditure for elite development, expenditure for salary and administrative costs, the number of registered members, the number of people on the volunteer administrative boards of the sport associations, and the dummy variables, did not have a significant effect when regressed onto the dependent variable (the number of manplan A and B level athletes) based on the sports tested.

2) The sports utilization of the available resources (level of expenditure for elite development and salary/administrative costs, the numbers of people on the volunteer board of directors, and the numbers of registered members) did not have a significant effect on the number of level A and B manplan athletes in the sport associations tested.

3) Increased lottery dollar input since 1984 did not have a significant effect on the number of man plan athletes (level A and B).

Need for the Study

Presently, a lottery review is being conducted by the Manitoba Lotteries Foundation to review the acquisition and allocation of lottery funds in the Province of Manitoba. The results of the lottery review could have a profound impact on the current funding policies of the province toward amateur sport.

The Manitoba Government's Sport Directorate and the Manitoba Sport Federation are aware of the potential impact of the lottery

review and have supported the need for further research into areas that affect the attainment of elite athletic status. Therefore, before funding policy modifications, adaptations, or extensions are implemented based on this lottery review, an investigation into identifying the variance in the number of elite athletes in the province that has been due to the factors examined in this study would be helpful in future decision making. Once the variance has been explained in a manner that was relatively free of subjective biases, the implications of future policy changes would be easier to predict. Further, the results of this study would show where the greatest impact of the variables under investigation was located.

Delimitations

In order for this thesis to be completed, some delimitations must be made regarding the administration of the Directorate and the Federation, the administrators of the provincial sport associations, the level of Manitoba's amateur sport in comparison to the rest of Canada, and the nature of the desired data itself.

Therefore, the following were the delimitations for this study:

1. Only amateur sport associations that are members of the Manitoba Sports Federation would be considered in this study.

2. The sports under investigation were selected in a manner that eliminated any geographical (e.g. presence or absence of mountains) and/or environmental (e.g. longer periods of warm weather) biases that would lend a competitive advantage to participants in some sports such as downhill skiing, soccer, softball, and cross country skiing.

3. Special groups (e.g. Wheelchair sports), and the six regional sport associations were not included due to pronounced differences from the other sport associations.

4. Only revenues generated for amateur sports from their national sport association, provincially regulated lottery operations, provincial tax dollars, membership fees, and fund raising projects of the individual sport associations were used in this study.

Definition of Terms

Amateur Sport

Amateur sport consists of any physical activity which requires physical exertion, structured administrative format and elements of competitiveness. Participants may not receive financial compensation as a means of livelihood; however, financial compensation for incurred expenses is permissible.

Elite Amateur Status

Elite status was defined as receiving Man Plan Athletic Assistance from the Directorate (see appendix).

Membership

Membership referred to a verifiable, representative measure of participation in amateur sport. In order to be a member of a sport association, the participants paid annual fees and fulfill any other requirements of the association.

Elite Development

Elite development referred to all expenditure for the continued improvement of all athletes that have been identified as potential representatives of Canada in international competition. These expenditures included: coaches' and officials' development, travel to

competitions by athletes and coaches, travel to development camps/clinics for both athletes and coaches, coaches' salaries, equipment (uniforms, apparatus, medical supplies, etc), and the rental of facilities.

Volunteer Administrative Input

Input from volunteer administrators was determined by the total number of volunteers delegated to administrative roles.

Administration Expenditure

Expenditures for administration included the Administrative Credit and Salary Assistance programs of the Federation and all additional provincial sport association expenditures above and beyond the amounts allocated by the Federation in the aforementioned programs.

Administrative Credit

Administrative credit refers to the amount of credit the Federation allocates to each of the provincial sport bodies for duplicative, photocopying, and other administrative services. Additional services over and above the allocated credit limit are assessed a fee "at cost".

Salary Assistance

As referred to in this study, salary assistance was the amount of money the Federation allocated to the sport bodies to assist in the paying of administrators, secretaries, etc.

Chapter Two

Review of Related Literature

Over the last two decades, millions of dollars have been spent on amateur sport in Canada. Within that time frame, there have been several important international competitions in Canada including two Olympic Games. Concerns have surfaced with regards to the success of Canada's athletes and the enormous monetary expenditure that was required in order to send teams to these international competitions. In short, Canadians were concerned that they were not getting the biggest "bang for the buck" in terms of the amount of funding that went to amateur sport and the performance of Canadian athletes. These concerns were enhanced by improved media coverage that provided instantaneous results of poor performances to the general public. The question became, were administrators spending the resources allocated to sport in the most efficient and effective way possible? The argument continues to this day.

National Policy Toward Participation and Elite Development

In 1961, the objective of the federal government's policy was to foster mass participation in order that Canadians could achieve the highest level of skill that their abilities would allow. Following the publication of the 1969 Task Force for Sport's report and the subsequent poor performance of Canada's athletes in the 1972 Olympic Games in Munich, the federal government's policy emphasis on mass participation and passive government regulation of elite development was modified. The modifications that were instituted allowed for more direct federal government intervention and control of both funding and administration of elite development programs. In the

early seventies, participation was reinforced through the creation of an agency known as Sport Participation Inc., which had as its motto the familiar phrase "Participaction". In addition, elite development was enhanced by the creation of the Coaching Association of Canada, the implementation of "Game Plan", and the National Administrative Centre for Sport and Recreation in Ottawa (Macintosh, 1985). This change in the federal government's position on amateur sport preceded the improved performances of Canadian athletes from twenty-first place in the 1972 Olympic Games to eleventh place in the 1976 Olympic Games. In addition, Canada finished an unprecedented first in the Commonwealth Games in 1978 and fourth in the 1984 Summer Olympic Games. As Canadians became more aware of the excellent performances of Canada's athletes in international competitions, participation in the various sports increased (Taylor, 1975; Zilberman, 1985). Therefore, as the numbers of participants increased and more athletes became involved in sport, the need for an evaluation of the results of funding policy decisions became apparent (White & Leslie, 1983).

Volunteer Administrative Input

The increases in participation affected not just athletes, but parents, coaches, and friends that served as volunteer administrators in the sport associations. The importance of volunteers in sport needed to be considered as they were the backbone of the non-profit organization (Fisher, 1978; Halder, 1976). However, as sport continued to grow, another problem became apparent. Volunteers were putting a great deal of time into an organization which often led to burned out, over worked people (Fisher, 1978).

Although the problem is not as pronounced today, some volunteer administrators still occupy more than one role in their sport association. Beamish (1985) conducted research to identify the characteristics of volunteer administrators in amateur sport associations and to explain why people worked as sport administrators. Beamish found that the majority of volunteer administrators were from the upper socio-economic end of the yearly earnings spectrum, male, and more highly educated than the general population. In addition, he identified sport associations as being either instrumental or expressive in nature. Instrumental groups were characterized as requiring special skills to join, were long-term oriented, more bureaucratic than democratic, and had indirect means of gratification to attract membership. Expressive groups offered more immediate forms of gratification through activities and the lack of special skills required for membership in the association. Leadership (as well as overall membership) in an instrumental group evolved due to similarities between the occupations of the association's members and the association's needs, resources, and methods of goal attainment. Evidently, people volunteered for administrative duties because they received gratification for their efforts.

National Sport Funding

Historically, four types of funding agencies have evolved in amateur sport: the federal government, the provincial government, provincial sport associations, and other non-profit agencies. On the national scale, a great deal of research has been conducted because of Canada's role in both the 1976 Olympic Games and the 1978 Commonwealth Games (Jackson, 1979; Jackson, 1981; Taylor, 1975;

Zilberman, 1985). The federal government had to decide if funding should be put toward elite development, participation, or both. This problem area was the focus of a document entitled *A Proposed Sports Policy for Canadians* which was released on March 29, 1970. This document outlined the federal government's policy as being focused on the pursuit of excellence in international sport and the physical well-being of all Canadians (Olafson & Brown-John, 1984). The question of where to get the necessary funding had been partially answered in 1969 with the initiation of the national lottery known as Lotto Canada. It had been created to assist in the funding of both the 1976 Olympic and 1978 Commonwealth Games, but after the games were over, it continued to help by appropriating a percentage of the total revenues to amateur sport. Although the money was available, the problem was that funding elite development and mass participation were perceived as contradictory (Buggel, 1984; Franks & Macintosh, 1982; Jackson, 1978).

Manitoba's Sport Funding

On May 1, 1962, the Manitoba legislature assented to an Act Respecting Fitness and Amateur Sport and thus created a vehicle to utilize federal monies for amateur sport in the province. This vehicle was the Fitness and Amateur Sport Branch of the Department of Welfare. Over the years, the Fitness and Amateur Sport Branch has evolved into the Provincial Sport Directorate. Until 1970, the bulk of funding for amateur sport was handled through the Directorate via funds allocated from its parent department.

On July 21, 1970, Bill 36 an Act of the Manitoba Legislature was ratified and officially created the second major amateur sport funding

agency; the Manitoba Sports Federation. The Federation was charged with the duties of assisting amateur sports through the provision of administrative services such as secretarial and duplicating services. The services of the Federation were expanded as the administrative needs of the amateur sport associations grew.

On May 21, 1971, another agency was formed that was to have tremendous impact on the development of amateur sport in Manitoba: the Manitoba Lotteries Commission. The Commission was responsible for the operation of lotteries from which revenue could be generated for the cultural and recreational use of the citizens of Manitoba. In 1975, the sale and distribution of lottery revenues was taken over by the Western Lottery-Manitoba Distribution Inc., from the Manitoba Lotteries Commission. Revenues generated from lottery ticket sales were distributed as follows: 51% to the Western Lottery-Manitoba Distribution Inc., of which a percentage went to amateur sport, and 49% to the Manitoba Lotteries Commission.

The Federation later became a partner in the Western Lottery-Manitoba Distribution Inc., and, therefore, received its percentage of lottery revenues independent of the Directorate. The Directorate continued to finance amateur sport with a combination of lottery money and tax revenues. In June, 1979, the Directorate signed an agreement with the Federation that turned over responsibility of the Administrative Centre for Sport and Recreation to the Federation.

As revenues generated by the Manitoba lotteries increased, more and more money was made available for amateur sport. In the eighties, several key changes occurred in the administration of funds to amateur sport. On September 21, 1984, the Federation and the

Manitoba Lotteries Foundation, which had taken over the operations of the Western Lottery-Manitoba Distribution Inc., signed an agreement to work together to fund amateur sport (Master Funding Agreement, 1984). Under the terms of the agreement, the role of the Federation was as follows:

> ...the Federation has agreed to assist the Province to achieve their goal of equitable distribution of gaming revenues in the Province of Manitoba; and whereas the Federation has agreed to be the co-ordinator or umbrella organization respecting the funding of charitable sport organizations in the Province of Manitoba (p. 2).

In 1985, the Directorate and the Federation signed a master funding agreement that formalized their respective roles in the funding and administration of amateur sport in Manitoba. The Directorate was charged with being responsible for annual planning and program implementation while the Federation was responsible for the operations of the Administrative Centre for Sport and the provision of administrative services to its member sport associations. Both organizations were concerned with educating the public about the benefits of participation in sport and to improve the quality of sport in the province.

In Manitoba, sport associations are funded by both the Federation and the Directorate through their own respective two-part processes. The first part of the Federation's system utilizes a point accumulation strategy based on points acquired from a review of the Sport Profile of each sport and personal interviews conducted by the Federation staff. The seven criteria measured in the profile are; membership, organization and planning, competition, public relations,

financial programs and elite development. The second part of the process involves using a statistical formula to assign a percentage point value to the sport associations. Funds are then distributed on a dollar value per percentage point basis.

The first stage of the Directorate's procedure involves a consultation process to determine the future needs of the sport association. This process involves a review of the same profile used by the Federation plus interviews with key members of the sport associations with regard to their program plans and objectives. Once the Directorate staff reviews and weighs the funding application against funding criteria (budgetary constraints of the various program grants), the staff then make recommendations to the Minister responsible for sport within the Department of Health. The second stage involves a review of the sport association's previous budget and then adjustments are made to the proposed budget in accordance to whether or not the sport association over or under spent their previous budget.

Both the Directorate and the Federation allocate funds to the sport associations based on information acquired over a one year time period. The continued growth of amateur sport could be jeopardized by the major lotteries review now underway of the allocation procedures of lottery revenues to all beneficiaries by the Manitoba Lotteries Foundation (B. Crook, personal communication, February 15, 1988). The results of this lottery review could have a significant impact on distribution policies and current funding levels granted to each beneficiary. At the present time, amateur sport has been "capped" at 1986-1987 levels until the lottery review is completed.

Problem Areas for Canadian Amateur Sport

In addition to the problems caused by the contradictory needs of elite athletes and recreational athletes, research has indicated several other problem areas. These have included: a lack of unified federal control, poor communication between the provinces and the federal government (Jackson, 1978), an over reliance on volunteers (Taylor, 1975), an inefficient national plan for excellence, and insufficient media coverage of Canada's elite athletes (White & Leslie, 1983: Zilberman, 1985). Of the above problems, the greatest concerns were related to the poor media coverage of Canada's elite athletes. It was believed that poor exposure would have a detrimental effect on participation. Without increased participation, it was more difficult for coaches to identify potential elite athletes. References were made to the successes that were experienced by the eastern block countries in international competition and the staggering amount of participation within those countries (Zilberman, 1985).

As for the other problem areas, possible solutions ranged from the addition of an administrative council, separate from government, that would monitor funding policy for amateur sport (Jackson, 1981), to changing the accepted notion that coaching was not a prestigious occupation and therefore unworthy of compensation (Zilberman, 1985). The overall thrust of the above research was to create the best possible climate for achieving the sport association's objective: developing all participants to their highest level of ability.

In the eighties, participation grew at an incredible rate and athletic performances in international competitions improved. Indeed, both participation, and the increased availability of funding,

were shown to be influential in the changes in the numbers of elite athletes.

As involvement in sport grew, new problems began to arise as volunteer administrators were unable to handle the managerial duties for which they were responsible (Taylor, 1975). The complexities of amateur sport brought on the need for professionally trained, full-time administrators and support staff (Bratton, 1983: Mitchelson & Slack, 1983). However, with all the attention on the need for professional administrators, the role of the volunteer administrator was not forgotten. Volunteers continued to play important roles in various aspects of participation in amateur sport. However, the demand for their services in most elite areas (e.g. elite coaching and officials) diminished. As competition for resources became more intense, existing volunteers were called upon to handle more responsibilities. With the increased responsibilities and the subsequent greater demands on time, energy, and personal expense, came the problems of early retirement and burn out due to overuse. A possible explanation for the increased frequency of volunteer attrition was proposed by Fisher (1978) and Conners and Callaghan (1982) when they stated that volunteers were not receiving sufficient gratification for the effort they were putting into the organization. Despite the increased frequency of volunteer withdrawal, some volunteers remained as administrators and performed numerous roles for their sport association.

Need for Additional Research

In order to understand the interaction of the variables that have been identified as important to the development of amateur sport such

as: membership, volunteers administrative input, expenditures for elite development and expenditures for professional staff, more research needs to be conducted. In other fields and disciplines, administrators have turned to previous research and theoretical models to assist them in understanding a problem area. However, in amateur sport, the models that exist are either descriptive of the current situation (Sport Model: Quadrennial Plan, 1988) or predictive of athletic performance (e.g. maximum Vo^2 as a predictor of success in the mile run). No study in the literature attempted to determine the effects that membership, volunteers, and expenditures for elite development and administration, have collectively had on the actual attainment of elite athletic status. Because of budgetary cutbacks and the increasing demand for accountability with respect to funds that exists in today's political climate, this lack of research is alarming. Therefore, in order for amateur sport associations to achieve their objectives effectively within the increased constraints of today's society, more research is needed.

Summary

Research has indicated how important volunteer administrators, participation, expenditure for elite development, and expenditure for professional administrators have been on the attainment of athletic success in amateur sport. However, there has been a lack of research on the collective importance of these variables on the attainment of elite athletic status in Canada. Of the research that has been conducted, the results have been questionable because analytical techniques that lend themselves to causal inferences have not been used. In the past, subjective means were the most commonly

employed methods to assess the success of the various programs. Administrators reviewed their program and implemented whatever changes were needed to correct or improve on problem areas for the future. The problem with this approach is that it does not utilize information derived from sound, objective analytical techniques. Therefore, research is needed to provide administrators with the necessary information to make sound decisions when allocating human and financial resources.

Chapter Three

Methods and Procedures

The purpose of this study was to assess the cumulative and independent effects that the independent variables, volunteer administrator input, membership, expenditure for professional administrators, and expenditure for elite development program, have had on the dependent variable, number of elite athletes in Manitoba. A sub-problem of this study was to highlight any current or potential problem areas in the information monitoring and information gathering mechanisms of the Manitoba Sport Federation, Provincial Sport Directorate, and individual sport associations in order for any necessary adaptations and modifications to be implemented.

Subjects

The population for this study was comprised of the provincial sport associations housed in the Administrative Centre for Sport. Those sport associations that have received Manplan Athletic Assistance since 1983 (see appendix A), that were performed principally indoors to offset any environmental biases, and that do not have biases due to geographic location, were selected for this study (see Table 1).

Research Design

The design of this study was an ex post facto design. This type of design was necessary due to the non-direct manipulation of the independent variables and the historical nature of the data (Kerlinger, 1973). In order to assess the effects of the independent variables on the dependent variable, a multiple regression analytical model was

Table 1

Manplan Sports since 1983

Gymnastics	Swimming
Handball	Racquetball
Wrestling	Diving
Judo	Squash
Athletics	Figure Skating
Speed Skating	

applied over successive years from 1983 through 1987 according to the following equation:

$$Y = B_0 + A_1D_1 + A_2D_2...A_{n-1}D_{n-1} + B_1X_1 + B_2X_2 + B_3X_3 + B_4X_4 + e_k$$

where: n = the number of sports in the model

A = intercept term of the class n

D = dummy variable for the class n

B_0 = the intercept constant

B_k = the regression coefficient (beta)

X_k = the scores of the independent variables

Y = the dependent variable.

e_k = error term (Cassidy, 1981).

According to Cassidy (1981):

> Regression is a statistical technique that attempts to "explain" or "predict", in the form of a single empirical equation, movements in one variable, the dependent variable (or "regressand"), as a function of the movements in a set of variables, called the independent variables (or "regressors")" (p. 4).

Multiple regression provided a quantitative analytical model which could be used to describe current situations and/or predict future changes in selected sport variables caused by variance in other variables. When using multiple linear regression, problems with data often arise (Cassidy, 1981). The relatively few numbers of years of data (N=5) may present a problem in this study. Low numbers of observations are detrimental to the precision of the results due to error in constructing the estimated regression line and the corresponding small denominator degrees of freedom for the F- test. To improve the overall power of this equation, dummy variables (zero or one) were used to pool data from similar sports and, therefore, improve the degrees of freedom in the equation .

The dummy variables compared the means of their designated sports, which were assigned the value one, against the means of the other sports which were assigned the value zero. If the difference between the means was not significant (as determined by a t-test), then the variable assigned the value one was not statistically different from the variables that were assigned zeros. Thus, the data from the sport represented by the dummy variable could be pooled with the data from the other sports in the equation. If the dummy variable was significantly different from the other sports, then the opposite action occurred and the data from the dummy variable sport and the data from the remaining sports were not pooled within the regression. Thus, the sports were not statistically similar and, therefore, were treated separately by the model. The overall effect of the dummy variables was to separate those sports that were statistically different

from the other sports in the study in order for comparative analysis to be conducted.

Data Collection

The ratio data were collected as follows: expenditure data for program and administration was acquired from a review of funding documentation and audited financial statements of the Directorate, the Federation, and individual sport associations themselves. In addition, membership figures and volunteer input information was gathered through documentation (e.g. Sport Profiles) of all three organizations. All data required discussions with the sport administrators to clear up any discrepancies that were encountered when using "block" grants (e.g. sport special project grants, gaming fund grants) and ambiguous account names. Contact with the sport administrator was made a minimum of one week prior to data collection to each sport association by mail or phone, as well as to the Directorate and Federation, to allow time to prepare the necessary information.

Data Analysis

All regression analysis was completed using the Statview 512+ statistical package on the Apple Macintosh SE computer. This software package computes simple correlation coefficients (r) between the independent variables and tests for significant differences with F-test, computes the coefficient of determination (R^2), as well as the Durbin-Watson statistic (DW). The coefficient of determination represents the approximate percentage of variance in the dependent variable (manplan athletes) that was accounted for by the cumulative changes in the independent variables (administrative and salary costs, expenditure for elite development, membership, and number of

members of the volunteer administrative board and the dummy variables). The DW statistic tests for problems in the data that can confound the results of time series multiple regression research. More will be said about the DW statistic in chapter four. Once collected, the membership and volunteer data were used in their raw form for each sport association. Expenditure data were grouped in such a way that one aggregate figure for administration and salary assistance per year and one aggregate figure for elite development per year were used for each sport association (e.g., each sport had five values for each of the four independent variables). After compiling the expenditure data into either elite development or administrative and salary costs, each figure was multiplied by 100 and then divided by the Consumer Price Index for Winnipeg to convert the dollars spent from nominal to real dollars (i.e.) constant at 1981 dollar amounts. The effect of this procedure was to eliminate "cost of living" increases related to inflation and reveal the actual increases in expenditures due to incentive, reward, and program expansion (see appendix B).

Data for the independent, dependent, and dummy variables, were entered into the regression model and subsequent analysis was conducted in three ways. A preliminary analysis was used to finalize the number of dummy variables to be used in the final analysis and to check the data for potential problem areas. A second analysis involved documenting the effects of the non-dummy regressors (the four previously mentioned independent variables) on the dependent variable manplan athletes. The final analysis utilized the significant dummy variables to determine how well the sports used in this sample performed in producing elite athletes from the available resources.

Chapter Four

Results

The intent of this study was to assess both the cumulative and independent effects of the expenditures for elite development, expenditures for administrative and salary costs, membership, and number of people on the volunteer board of directors on the production of elite athletes in Manitoba. A sub-problem of this study was to recommend (if necessary) changes in the information collection and delivery systems of the sport associations which would benefit future research. The results of the multiple regression analysis are presented in the following sections: preliminary analysis, analysis of individual regressors (non - dummy), and combined regression/dummy variable analysis.

Preliminary Analysis

Once data from all eleven sports had been entered into the model, a trial run of the model was utilized to: a) check the effects of the dummy variables on the overall equation, b) to ensure that the data were as "clean" as possible with regards to potential problem areas in regression research, and c) test whether the effects of on the selected independent variables on manplan athletes were significantly different from zero.

In order to test whether or not the results of the regression were significant, an *a priori* confidence level of $p \leq .10$ was used, reflecting the preliminary nature of this research. Results of the preliminary analysis indicated that five of the eleven dummy variables (sport 1, 2, 5, 6, and lottery) were not significant and were

Table 2

Non-Dummy and Dummy Regressor Beta Coefficients

Parameter:	Beta Value	t-Value	Probability
ITERCEPT	8.639		
Admin/Salary	5.734×10^{-5}	.823	.4156
Elite Dev	2.689×10^{-5}	.987	.3296
Membership	-.001	1.149	.2577
Vol Admin	.314	1.54	.1316
Sport 1	-4.755	1.187	.2424
Sport 2	-2.561	1.13	.2652
Sport 3	-11.189	7.798	.0001
Sport 4	-11.303	7.61	.0001
Sport 5	-.241	.077	.9388
Sport 6	-5.137	.649	.5199
Sport 7	-6.581	4.671	.0001
Sport 8	-15.316	3.151	.0031
Sport 9	-7.548	4.087	.0002
Sport 10	-10.177	4.541	.0001
Lottery	1.149	1.345	.1865

subsequently eliminated as independent variables (see Table 2). The remaining significant dummies (sports 3, 4, 7, 8, 9, & 10) shifted their respective sport's "Y" intercept either above or below the overall "Y" intercept of 8.639 of in accordance with how well the sport utilized its available resources. In other words, the Y intercept of 8.639 represents the point where the estimated regression line (derived from the pooled data of statistically similar sports) crossed the Y axis. Significant dummy variables indicated that the sports attached to those dummy variables were not similar (statistically) to

the pooled sports and, therefore, individual regression lines were estimated for each of these sports. Consequently, the points where their regression lines crossed the Y axis were either above or below the pooled intercept as indicated by the size and sign of the beta coefficient. For example, if a sport dummy variable was significant, and had a beta coefficient of 1.00, this would indicate that the sport associated with that particular dummy variable intersected the Y axis 1.00 units above the overall intercept of 8.639. The number of dummy variables must be one less than the number of regressors; therefore, the dummy variable sport 11 was not used in the preliminary analysis to avoid perfect multicollinearity betweeen the dummy variables.

Analysis was also undertaken to measure the effects of the expenditure variables (elite development, and administrative and salary costs) on each other in order to rule out false results from interference due to their magnitude and degrees of variance (multicollinearity). The procedure used was two-fold: a) the model was tried without one of the variables to see if significant changes occurred in the other variable's results (this procedure was repeated for both variables). If the regression coefficients were being influenced by interference from one of these variables, then the results would differ in significance, sign, or both (Cassidy, 1981). The second procedure (b) involved construction of a correlational matrix to check the degree of intervariable correlation between the non-dummy variables. If the correlations were less than the computed R^2 value, then intervariable correlation was not a comfounding issue (Cassidy,

Table 3

Correlational Matrix: Four Regressors and the Dependent Variable

Correlation Matrix for Variables: X_1 ... X_5

	admin/s...	elite dev	member	vol admin	manplan
admin/salary	1				
elite dev	.573	1			
member	.528	.17	1		
vol admin	.587	.419	.557	1	
manplan	.27	.463	-.145	.182	1

1981). The results of removing one of the expenditure variables were no different than the preliminary analysis results using both variables; therefore, intervariable interference was not a problem thus far. Analysis of the correlation coefficients of the two independent variables (as well as for all four variables) were substantially less than the computed R^2 value of .903 (see Table 3). However, the correlation between volunteer administrators, membership, and elite development is not weak and could be evidence of a possible interaction effect between the three variables. As removal of variables also did not produce significant changes, the effects of detrimental intervariable interference were judged not to be a problem with this regression. Furthermore, significance of most of the beta coefficients suggests the absence of the multicollinearity problems caused by the masking effects of high inter - variable correlation. High amounts of inter - variable correlation cause difficulties for the regression equation to separate the variables. Consequently, significant regression coefficients are masked by the highly correlated variables.

A third series of tests were performed to rule out the possibilities of two additional problem areas characteristic of regression research. The problem areas of interest were: autocorrelation and heteroskedasticity. Cassidy (1981) described autocorrelation as a problem that is particularly prevalent with time series data. Autocorrelation occurs when the error term of time (t) is correlated with the error term of time plus one (t+1). Autocorrelation presents a problem because systematic correlation of error terms violates one of the major assumptions of regression research. The assumption in question refers to a shock or extreme value in another time affecting the error term for time (t) when such a shock should not affect the error terms of subsequent time periods (Cassidy, 1981). One of the most popular tests for autocorrelation is the Durbin-Watson (DW) statistic. A DW of approximately two indicates that the data are sound and autocorrelation was not a problem (Cassidy, 1981). The DW statistic for this model was 2.14 which indicated that autocorrelation was not a major problem in this study (see Table 4).

The data used in this model were cross sectional as well and, therefore, subject to the effects of heteroskedasticity. Cassidy (1981) refers to heteroskedasticity as lack of equality in the degrees of dispersion in the error term due to changes inherent in cross sectional data. A method of testing for heteroskedasticity is to graph the residuals and look for a random dispersion. A non-random dispersion indicates that heteroskedasticity was a problem. The results of the graphical analysis of the four non-dummy regressors are presented in figures one, two, three, and four. Overall, the residual

graphs displayed random dispersion, however, due to the masking effects of using both time series and cross sectional data, as well as the slightly suspicious graph in figure two, further measures were warranted. In order to ensure that heteroskedasticity was not a confounding issue, the expenditure variables were converted to ratios of expenditure over membership to alleviate most of the common variance between them. If heteroskedasticity was a problem that was being masked by the mixture of data types, then the resulting signs and/or significance of the regression coefficients would change. This was not the case; therefore, heteroskedasticity was judged not to be a confounding factor in this study (see Table 5).

A final potential problem area that was analyzed in the trial run of the model was the question of whether or not the regression of manplan athletes on the selected regressors was significant. The results of this analysis are presented in Table 4. In order to assess the significance of the regression, an F-test is performed. According to Kerlinger and Pedhazur (1973) a significant F-test: " ... means that the relation between Y and a linear least squares combination of X_1 and X_2 could probably not have occurred by chance" (p. 58). The F-test statistic generated from this application of multiple regression was 36.208, N=55, $p \leq .10$. The F statistic only describes the statistical significance of the regression of one variable on a group of regressor variables. To understand the magnitude of the regression, the F statistic is not sufficient; therefore, the coefficient of determination (R^2) is used. The R^2 value indicates the approximate percentage of

Table 4

Overall Regression and Analysis of Variance Results

Degrees of Freedom	Durbin-Watson	Coefficient of Determination
54	2.14	.903

Analysis of Variance Table			
Source	Degrees of Freedom	Sum Squares	F-test
Regression	11	1517.842	36.208
Residual	43	163.867	p = .0001
Total	54	1681.709	

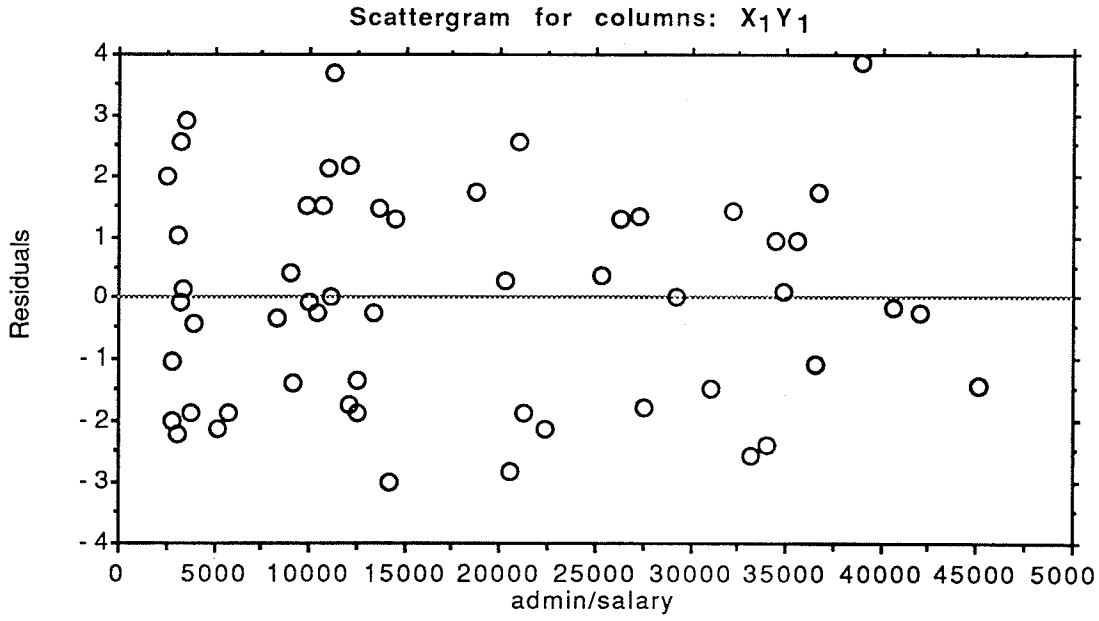

Figure 1. Residual Plot of the Administrative / Salary Regressor.

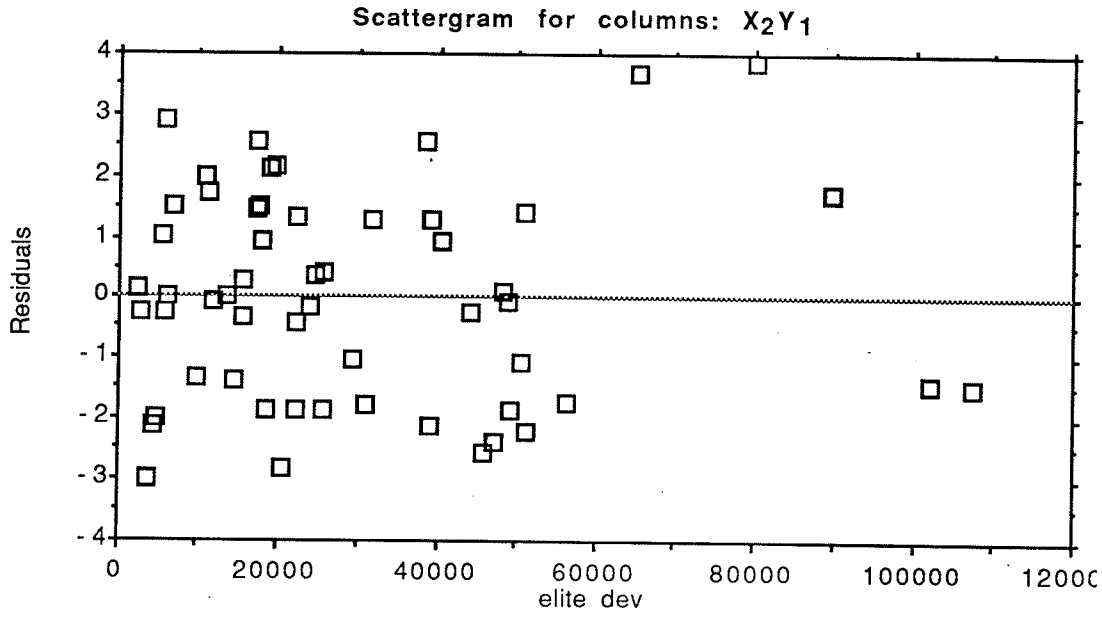

Figure 2. Residual Plot for the Elite Development Regressor.

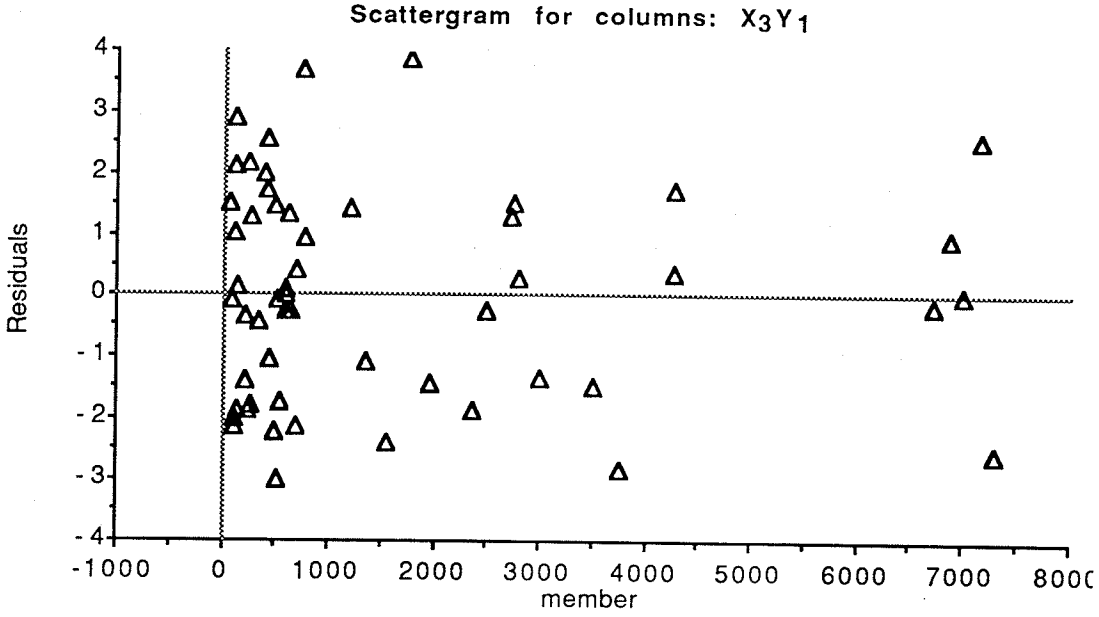

Figure 3. Residual Plot for the Membership Regressor.

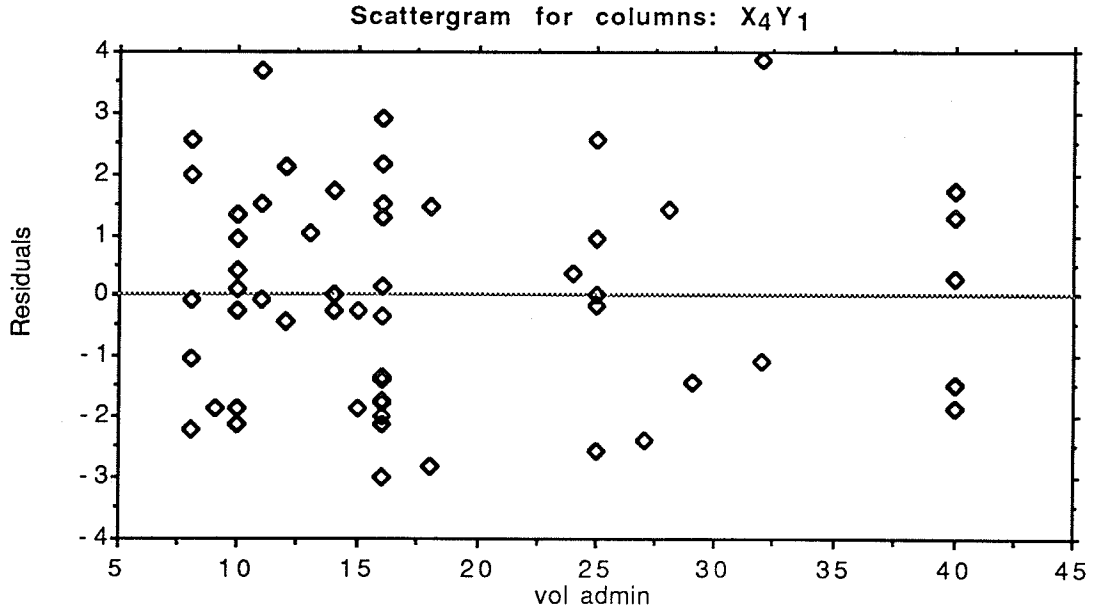

Figure 4. Residual Plot for the Volunteer Administrator Regressor.

variance in Y that was accounted for by changes in the X variables in combination (Kerlinger & Pedhazur, 1973). Table 4 gives the R^2 value for this model as .903 which means that approximately 90% of the change in Y was accounted for by a combination of variance in the regressors.

Analysis of the (non-dummy) Independent Variables

The reason for using a multiple regression technique was to assess both the cumulative and independent effects of the regressors on the dependent variable in accordance with the three null hypotheses. In this section, results of the four non-dummy variables (admin/salary, elite development, membership, and volunteer administrators) are presented.

Table 5

Results of Test for Heteroskedasticity

Parameter:	Beta Value:	t-Value	Probability
ITERCEPT	2.816		
Admin/Salary	-.005	.217	.8295
Elite Dev	.028	2.122	.0397
Membership	-.002	8.702	.0001
Vol Admin	.638	9.131	.0001
Racquet	-8.867	6.273	.0001
Hand	-10.64	7.73	.0001
Dive	-6.314	3.049	.0039
Gym	-17.411	9.78	.0001
Wrestle	-5.116	3.831	.0004
Swim	-5.263	3.367	.0016
Speed	.387	.254	.8005

Administrative/Salary costs

Administrative and salary costs were defined in chapter one as the amount of money that the Manitoba Sports Federation and the individual sport associations spent on salaries for professional administrator's as well as certain administrative items such as stationary, photocopying, etc. The sport association received a grant from the Federation for a maximum of sixty five percent of the administrator's salary and a non-cash credit limit for certain administrative items. The sport association was charged with the dual responsibility of making up the difference in the salary and paying for any overruns in administrative credit.

Regression analysis indicated that the beta coefficient for the administrative and salary costs variable was .00008289 and was not significant at the $p \leq .10$ level (see Table 6). This result indicated that for every one dollar increase in administrative and salary costs, there was an inconclusive change in the predicted number of elite athletes in the sport association, keeping the other regressors constant. Therefore, it can be concluded that the expenditures for administrative and salary costs were not significantly related to the number of elite athletes in Manitoba.

Elite Development

Elite development was defined as the amount of money expended by the sport association towards improvements in elite athletes, officials, and coaches. Regression analysis indicated that the beta coefficient for elite development was .00005811 and was significant at the $p \leq .0009$ level (see Table 6). This result indicated that for every $10,000 increase in the dollars spent on elite development, keeping all other variables constant, there was a corresponding predicted .58 person increase in the estimated number of elite athletes in Manitoba. Therefore, based on the results of this study, it can be concluded that expenditures for elite development did have a significant effect on the number of elite athletes in Manitoba.

Membership

Membership, was defined as the number of registered members in the sport association that paid membership dues and were accountable to the sport association. The beta for membership generated from the regression model was -.002 and significant at the

Table 6

Non-Dummy and Significant Dummy Regressor Beta Coefficients

Parameter:	Beta Value:	t-Value	Probability
ITERCEPT	5.067		
Admin/Salary	8.289×10^{-5}	1.314	.1957
Elite Dev	5.811×10^{-5}	3.561	.0009
Membership	-.002	9.765	.0001
Vol Admin	.37	3.598	.0008
Raquet	-8.305	7.095	.0001
Handball	-8.301	6.602	.0001
Diving	-4.411	3.967	.0003
Gymnastics	-13.958	6.682	.0001
Wrestle	-4.991	4.43	.0001
Swimming	-8.336	4.279	.0001
Speed	2.216	1.974	.0548

$p \leq .0001$ level (see Table 6). This result indicated that for every 2000 people added to the number of registered members of the sport associations tested, there was a two person decrease in the estimated number of elite athletes (all other variables held at constant levels). Based on this result, it can be concluded that the number of registered members of the sport association did have a significant negative effect on the number of elite athletes in Manitoba.

Volunteer Administrator's

Volunteer administrators were defined as those volunteers in the sport association that assisted in making policy and funding decisions for the sport association and were entitled to vote within the association. In most cases, the people involved were members of the sport's executive council. However, if the executive council's meeting was open to the public, anyone could offer suggestions for policy

decisions. Therefore, those individuals not fitting the above definition were not used in this study. The beta coefficient for volunteer administrators was .37 and was significant at the $p \leq .0008$ level (see Table 6). This indicated that for every one person increase in the size of the volunteer administrative board, there was a corresponding .37 person increase in the predicted number of elite athletes in Manitoba (again, all other variables held constant). This result must be treated with caution because the variable volunteer administrators is a proxy variable. Causal inferences should not be made based on results from a proxy variables because such a gross variable represents the researcher's method of quantifying an area for study that may not reflect the actual source of the effect (Cassidy, 1981). Therefore, until further research is conducted, this result should be treated as an indicator that volunteer administrators are very improtant to the production of elite athletes. Further, it can be concluded that changes in the size of the volunteer administrative body did have an effect on the number of elite athletes in Manitoba.

Dummy Variable Analysis

The intercept shifting dummy variables were not used in this study to enter nominal data into the model, but rather for strengthening predictability of the model by pooling some data while separating some of the data that was subject to pooling in order to increase the degrees of freedom of the equation. In addition, dummy variables permitted analysis to be conducted as follows: 1) determining which sports did a better job of producing elite athletes with the

available resources, and 2) the effects of lottery dollars on the production of elite athletes.

Analysis One: Sport Efficiency in Elite Athletes Production

Table 6 displays the beta coefficients for the significant_dummies used in this model. Sport dummies three, four, seven, eight, nine, and ten, all had negative beta coefficients which indicated that the "Y" intercept for the estimated regression line representative of their sport was lower than the overall "Y" intercept by a distance equal to their regression coefficient. Based on this analysis, the sports represented by negative beta coefficients (handball, diving, racquetball, gymnastics, wrestling, and swimming) did a poorer job of producing elite athletes with the available resources than all the other sports in the study.

The effects of the sports that were not represented by a significant dummy variable are found in the overall intercept of 5.067 (see Table 6). This value represents the "Y" intercept for the linear relationship that was predicted by the regression equation used in this study. Consequently, sports found here (squash, athletics, judo, and figure skating) did a better job in producing elite athletes given the available resources than the sports with negative dummies. According to the results of this study, speed skating did the best job of producing elite athletes with the resources available as evidenced by its significant and positive beta coefficient 2.216 (see Table 6). This result indicated that the estimated regression line for speed skating, as represented by the dummy variable sport 11, was 2.216 units higher than the overall regression line. Based on the results

presented, it can be concluded that the way the sport associations utilized their available resources did have a significant effect on the number of elite athletes.

Lottery Dollar Effects on Producing Elite Athletes

In an attempt to assess the effects of lottery dollars on the attainment of elite athletic status in Manitoba, two procedures were used: a) the effects of lottery dollars that were included in the expenditures for elite development by the sport associations over the full five year time frame of the study, and b) a dummy variable was created to measure the change in the amounts of money available to the sport associations over the last two tears of the study. This period corresponds to increased lottery revenues that were incurred by the sport associations after the signing of the September of 1984 lottery agreement (Master Funding Agreement, 1984).

The first analysis indicated that lottery money for the entire time frame of the study did have a significant effect on the numbers of elite athletes based on the significant beta coefficient .00005811 at $p \leq .0009$ level for elite development discussed earlier. This result is supported by the fact that funds used for elite development by the sport associations were from lottery revenues such as bingos and gaming fund grants from the Manitoba Sports Federation (Reports to Sport Congress, 1987).

Analysis two indicated that the dummy variable (lottery) was not significant at the $p \leq .10$ level (see Table 7); therefore, the changes in the amounts of money expended on elite development and administrative and salary costs, due to the lottery, were already

accounted for in the expenditure variable above. Therefore, the results for the other variables listed in Table 7 are not the ones used in the final analysis. Those figures are presented in the existing Table 6.

A comparison of sports that were primarily educationally (high school varsity sports) related and sports that were community club oriented was desired, but not possible due to insufficient numbers of educational sports.

Table 7

Lottery Dummy Variable Test Results:

Parameter:	Beta Value:	t-Value	Probability
ITERCEPT	4.968		
Admin/Salary	7.962×10^{-5}	1.26	.2145
Elite Dev	4.475×10^{-5}	2.114	.0405
Membership	-.002	9.515	.0001
Vol. Admin	.399	3.731	.0006
Racquet	-8.747	6.982	.0001
Hand	-8.859	6.429	.0001
Dive	-14.249	6.753	.0001
Wrestle	-4.999	4.436	.0001
Swim	-8.145	4.16	.0002
Speed	1.925	1.659	.1045
Lottery	.742	.991	.3275

Chapter Five

Discussion and Conclusions

Introduction

This chapter will present relevant discussion of the results presented in chapter four in the following sections: a) statement of the problems addressed in the study, b) discussion of results pertaining to non-dummy regressors, c) discussion of the dummy variables, d) recommendations relevant to the sub-problem of this study, e) conclusions, f) recommendations for future research, and g) summary.

Statement of the Problem

The primary problem addressed in this study was to assess the cumulative and independent effects of expenditures for elite development, paid administrators, membership, and the number volunteer administrators, on the number of elite athletes in Manitoba. A sub-problem of this study was to recommend (if any) possible changes in the information gathering and handling systems of the sport associations involved that would benefit future sport research.

A goal of the study was to open the door for future research into several critical areas of importance to successful sport programs and to offer a different approach to determining the relative success of a sport association. It was hoped that the information presented in this study could be utilized not only as a guide for future research into sport, but to offer a vehicle to effectively compare provincial sport programs and predict future athletic successes for elite athlete development that was free of subjective biases. Once such a vehicle existed, perhaps sport administrators from across Canada could see

where other sports were succeeding or struggling as compared to their own program and changes could be instituted to improve sport as it relates to elite development.

Discussion on Elite Development

The beta coefficient for elite development was both positive and significant which indicated that for every $10,000 dollar increase in expenditure for elite development, with all other variables held constant, the estimated number of elite athletes increased by .58 persons. This result was not surprising considering the opinions of several authors on the keys to successful sport programs. Halder (1976) in a paper on the Olympic Trust fund, expressed his view that several areas needed to be addressed in order for amateur sport to improve. Two of the areas mentioned were the overall financial strength of the sport associations and the accountability of funds expended by sport associations on elite development. Halder felt that fund raising operations were needed to assist governmental funding (such as the Olympic Trust fund) in financing the ever increasing needs of sport. Secondly, in order to acquire additional funds, amateur sport associations had to improve their accountability of available resources. The results of this study supported Halder's observations in that efforts of sport associations to increase funding for elite development would be rewarded by increased numbers of high calibre elite athletes. More recently, Zilberman (1985), a former world class wrestler from the eastern bloc who is now living in Canada, compared the sports delivery systems of eastern bloc countries with Canada's. Zilberman felt that the increased

performance of Canadian athletes in the 1984 Olympic games was primarily attributable to increased expenditure on elite development.

Two important points to note with regard to the elite development results of this study were: 1) the size of the beta coefficient, and 2) interpretation of the coefficient of determination (R^2). The beta coefficient for elite development was extremely small, consequently, it would require a large sum of money to see a sizable increase in the number of elite athletes in Manitoba (with all other variables held constant). This result represented the independent effect of the variable elite development on the dependent variable manplan athletes. Secondly, the coefficient of determination represented the approximate percentage of variance in the number of elite athletes in Manitoba that was accounted for by cumulative changes in the regressor variables. The R^2 for this application was .903 which meant that approximately 90% of the change in elite athletes was credited to changes in all of the regressor variables. Further, since expenditure for elite development was one of the regressors, part of that 90% variance was due to elite development working together with the other regressors which represents the cumulative aspects of the regressors on the production of elite athletes.

Discussion on Administrative and Salary costs

In this study, the amount of money expended on salaries of administrators and secretaries as well as the expenditure for certain administrative items (stationary, telephone, photocopying, etc) was not significantly related to the number of elite athletes in Manitoba

(beta value was .00008289, see table 4). On the surface, this result does not support Zilberman's (1985), and Frisby's (1986) claims that paid administrators were partially responsible for the improvements in Canadian amateur athletic performances. Zilberman based his conclusions on observations of Canadian amateur sport over time and not on statistical analysis. Frisby, on the other hand, used a statistical procedures coupled with survey research method to try and relate several variables that described a Weberian style of bureaucratic organization that was designed to enhance effectiveness to the successes of twenty-nine Canadian national sport association's athletes in world competitions. Based on correlational results, Frisby found that the structural variables career stability, and paid staff professionalism (as well as other variables) were significantly correlated to the ability of the national sport body to produce and maintain excellence in international athletic contests. The first part of the two-part career stability variable was paid staff turnover rate. Paid staff turnover rate referred to the mean number of years that the executive and technical directors positions had been available, divided by the number of incumbents. The correlational coefficient for paid staff turnover was .697 and significant ($p. \leq .05$). Therefore, variations in the turnover rates of paid administrators was significantly related to the effectiveness of the association in producing and maintaining athletes. Paid staff professionalism was another two-part variable that was found to be significantly correlated to elite athletic performances ($N=29$, $r=.526$, $p. \leq .01$). The second part of this variable was termed paid staff education which could range from high school to graduate

level education. The results of Frisby's study suggested that increases in the educational levels of the paid administrators was significantly related to the effectiveness of the sport association in maintaining and developing elite athletes in world competitions. Hence, the results of Frisby's (1986) study with regards to the importance of paid administrators to a sport association was not consistent with the results of this regression analysis. However, in this regression study, the expenditures used were total figures which included both time spent on elite components as well as non-elite aspects of the sport association's programs. A more accurate assessment would be possible if the amount of money that was spent on salary and administrative expenses for the elite part of the sport could be separated from the non-elite part and then entered into the model. Due to poor records and the absence of some of the administrators from the earlier years of the sport association, this separation was not possible for a majority of the sports given the time frame used in this study. With improvements in record keeping that have occurred over the past few years, it would now be possible to separate this variable. However, the sample size would be too small to be of practical use, therefore, more time is needed before this approach becomes viable for most sports.

A secondary consideration to be addressed was the possibility that Zilberman (1985) and Bratton (1983) were correct and sport administrators were not being paid enough to see a significant effect on the number of elite athletes. Obviously, if large enough numbers were entered into the equation, a significant result would be generated. Based on the tests of this model (a highly significant F test,

high R^2 , and absence of autocorrelation, multicollinearity, and heteroskedasticity), reasonable changes in regressors could be used to estimate Y, given the beta coefficients calculated in this study, to test Zilberman's and Bratton's statements. In other words, once next years funding levels, membership, and the number of people on the volunteer board of directors is known, these values can be inputted into the model and the number if elite athletes could be predicted.

A third consideration was the possibility that expenditures for administrative and salary costs did not have a direct effect on the production of elite athletes (as indicated in the results of this study) but rather an indirect effect through the other regressors. The coefficients of determination calculated by squaring the Pearson Product correlation coefficients for administrative and salary costs as well as the other two significant and positive regressors (elite development, and volunteer administrators) were 33% and 34% respectively. If the approximations based on these coefficients of determination were true, then over 1/6 of the effect elite development and volunteer administrators had on the number of elite athletes was accounted for by their relationship to administrative and salary costs (i.e. some multicollinearity exists, although it does not cause major problems). Consequently, adverse changes in administrative and salary costs would have an detrimental effect on the number of elite athletes even though a significant relationship does not exist.

The existence of an indirect relationship between the expenditures for administrative and salary costs and the production of

elite athletes makes intuitive sense. Given the relationship between the two positive significant predictors of elite athlete production to administrative and salary costs, it can be speculated that a good administrator would beneficially effect elite athlete production by his or her influence over the volunteer board, through his or her contacts both inside and outside the sport community. Conversely, through this same relationship, a poor administrator could have the opposite effect on the sport association.

A final point for discussion revolves around the mandate of the sport association. Every sport in Manitoba must have a clear mandate which represents a statement outlining the goals and objectives of the sport association. If the mandate of the sport association calls for the majority of available resources to be expended in non-elite programs, then the lack of significance of the administrative and salary costs variable would be acceptable. After all, the focus of the association was not on the production of elite athletes, hence, no further research into the effects of selected factors on elite athletic performance would be necessary. However, if the mandate of the sport association was strictly to produce elite athletes, then the expenditures for elite development would be of major importance to the sport administrator. Therefore, the results of this study should cause great concern for the sports involved because the excuse that the administrator was splitting his or her time between elite and recreational programs would not be supported. The two examples just presented represent the rare situation in amateur sport in Manitoba as the majority of sport associations have both recreational and elite programs. Therefore,

more research is needed that is geared toward narrowing down such rival explanations of the effects of expenditures for paid administrators salaries and administrative costs.

Discussion on Volunteer Administrators

The results of this study indicated that the beta coefficient for volunteer administrators was not only the largest coefficient at .37, it was also positive and significantly related to the number of elite athletes in Manitoba. As indicated in chapter four, for every one person increase in the number of volunteers that make policy decisions for the sport association, there was an estimated .37 increase in the number of manplan athletes (all other factors held constant). Hence, such a strong relationship to the attainment of elite athletic status warrants additional research to identify the causal elements buried within the gross variable used in this study. A possible interaction effect between volunteer administrators, membership, and elite development, which was not directly measured in this study, could have an indirect impact on the number of elite athletes in Manitoba.

Discussion on Membership

In this study, the membership variable had the second strongest effect on the number of manplan athletes with a beta value of .002 and was a significant predictor of the number of elite athletes in Manitoba (holding the other variables constant). However, the sign of the beta coefficient for membership, unlike the other significant non-dummy regressor beta coefficients, was negative which indicated that as the number of registered members of the sport association grew, the

number of elite athletes decreased. At face value, this result would be contradictory to the mass participation perspective that the more participants one has in their sport programs, the better the chances of finding an future elite athlete (Zilberman, 1985). Closer examination of the negative beta coefficient revealed that as membership increased, more people were utilizing the available resources of the sport association (resources that were being held constant by the model). Consequently, available resources would be diluted and fewer elite athletes would result. Given the strength of the effect of membership on the production of elite athletes, the apparent disregard for keeping both accurate and separate counts on both the competitive and recreational members of some sport associations was alarming. More attention needs to be focused on the continued improvements in accounting for the numbers and types of people involved in each sport association in order for future research to be conducted and effective evaluation to take place..

Discussion on the Dummy Variable Analysis

Dummy variables were used in this study to allow pooling of similar sports which increased the number of observations thereby strengthening the predictability of the equation by enhancing the residual degrees of freedom. The dummy variables used were of two types: 1) eleven sport dummy variables were used to determine which sport association did the best job of producing elite athletes given the available resources, and 2) one lottery dummy that was designed to test whether the increased revenues made available to sport in 1985 were significantly related to increases in the number of elite athletes.

A significant dummy indicated that the particular sport associated with the dummy variable was statistically different from the other variables and was, therefore, needed special consideration in the pooling. The effect of the dummy was to shift the Y intercept of the particular sport indicated by the dummy variable either above or below the overall Y intercept of 5.067, in accordance with the sign of the beta coefficient, and equal to the size of the beta coefficient. In turn, non-significant dummies indicated that the data from those sports could be pooled and their effects on the results of the regression would show up in the overall regression equation's Y intercept.

The results of this study indicated that speed skating did the best job of producing elite athletes based on the information given. In this model, a sport that had small values for the regressor variables and large numbers of elite athletes would do very well. Conversely, sports with large regressor values and small numbers of elite athletes would not do well in this model. The real value in using dummy variables in research of this nature lay in the ability of the dummies to separate out the performances of sports that casual observation could not distinguish between. For instance, the sports of Wrestling and Diving were below average in producing elite athletes (as were many others) in comparison with the other sports used in this study. The difference in their respective beta values was .580 in favor of Diving - a difference that would be very difficult to distinguish with casual observation. Therefore, analytical techniques (such as multiple linear regression) could enhance decision making by helping sport

administrators to correctly identify and react to differences that might exist between sports.

As for the lottery dummy, it was dropped due to its lack of significance. This indicated that over a two year time span, the increased revenues available to the sport associations had an inconclusive effect on the number of elite athletes in Manitoba. This result was not surprising considering the small amount of time used in the study, however, the time frame used in this study represented the longest time period possible given the parameters of the study.

Recommendations Relevant to the Sub-Problem of the Study

The sub-problem of this study dealt with the issue of whether improvements (if any) could be suggested to enhance the information gathering and monitoring systems of the amateur sport associations in Manitoba from a sport research perspective. The following recommendations were based on the problems encountered in the information gathering process used on the 11 sport associations in this study. Some of the problem areas are in the process of being addressed at this time, others are not. In addition, these recommendations are general in nature and not tailored to any one sport in particular. It is hoped that upon reading these recommendations, sport administrators will take the time and look at their own organizations apply the relevant suggestions presented here or come up with other new ideas for improving the existing system.

1) Adequate Documentation of Relevant Information

If the sport association is subjected to high administrative turnover, then increased efforts must be placed on careful and explicit documentation. Relevant information includes financial information that is separated for coaches, athletes, and officials, the long term goals for the association, membership composition (e.g., male, female, elite), and where the information is located. In many cases, the current sport administrator was not around in the earlier time periods of this study. This did not present a problem for those sports that had proper documentation. However, for the sports that did not have complete files, a great deal of time and effort was required to gather the data. Improved record keeping will enhance program evaluation and planning by allowing current administrators to benefit from incumbent administrative policies and programs as well as to help lay the groundwork for future development of the association. Further, proper documentation of relevant facts and figures will assure that future administrators and athletes would benefit from of the highest quality programs available. The lack of adequate documentation was responsible for the majority of sport attrition in this study and every effort should be made to see that this is not the case for future research and evaluation.

2) More Informative Financial Statements

Related to recommendation one above, sport associations need to focus some of their attention on the production of financial statements that can be better understood. Most of the sports in this study used audited financial statements (which should be continued)

that presented the revenue and disbursements of the sport association in a form that was acceptable under generally accepted accounting principles, but not very useful to someone outside the sport association. Auditors do not prepare the statements they evaluate, the sport associations do, therefore, care must be exercised to make the statement useful and informative. More informative means that the names of the accounts on the statement make sense to someone outside the sport association. When naming accounts, avoid general labels such as miscellaneous expenses, administration, travel, and salaries. Name the accounts so that anyone would know that the travel expenditure was for elite or recreational athletes, the administrator, technical director, or provincial coach, and separate the expenditure amounts. Some of the better sports were separating their provincial team expenditures out from the rest of the sport association and disclosing exactly what expenditure was for what program. In short, a person with some knowledge of the sport (perhaps a future administrator) would be able to tell where the money for the provincial team was spent. From a research point of view, every account should either have a description of the elements in the account in the text of the statement (like in the previous provincial team example) or in the notes attached to the statement. By taking the time to produce a statement that clearly and concisely details the receipts and disbursements of the association, the administrator will spend less time looking for financial information and more time administering to the needs of the sport. In addition, financial statements that clearly describe the activities of the sport association

over time would be beneficial for both current and future administrator's to design strategies that continue to build on past successes.

An additional aspect to consider with regards to the content of financial statements is the number of years included on the statement. Financial statements should have at least two and preferable four years of figures listed on the statement. The rationale for this is two-fold: 1) comparisons to previous years can be made quickly and easily when several years of information are presented on the same statement, and 2) with several years of data on one statement, information can be stored longer without the need for collecting additional paper. Currently, retired files in the provincial archives are destroyed after five years. Therefore, with several years on each years statement, overlap would occur which will provide a cushion of time before all of the financial information is lost forever.

3) Construction of Summary Sheets

With the advent of the sport profiles, a great deal of improvement can be seen in the information gathering systems of the sport associations over the last four years. Although thorough in their effect of gathering information in one document, some information may be better represented in a summary sheet format. As in the case of frequently called phone numbers, a similar listing of frequently used information might prove useful. In this study, the gross variables used would represent a small sample of the information that should be presented on a summary sheet (information of greater detail would be more appropriate). Additional benefits of using summary information

sheets are that references pertaining to the location and contents of the original information sources could be included which would allow administrators to store seldom used files in places where they can be easily recovered.

4) Initiate Discussions as to Who Has What Information

During the data collection phase of this project, several administrators were surprised to hear that neither the Provincial Sport Directorate or the Manitoba Sports Federation had certain historical information. If similar confusion exists for other sports, then perhaps more time should be spent outlining both the extent and number of years of information each of the sport governing bodies (Manitoba Sports Federation, Manitoba Provincial Sport Directorate) actually have in their files. By doing this, the possibility of information being destroyed or misplaced because it was believed that someone else was responsible for that information would be minimized.

Conclusions

The following conclusions were warranted based on the results of this study:

1) Regression analysis with intercept shifting dummy variables can be successfully used in sport research.

2) Approximately 90% of the variance in the estimated number of elite athletes in Manitoba was accounted for by changes in the regressors used in this study.

3) The regression of manplan athletes on the expenditures for elite development, administrative and salary costs of paid administrators, number of registered members, the number of

volunteer administrators, and the dummy variables was significant ($F(11, 43) = 36.208$, N=55).

4) The expenditures for administrative and salary expenses of paid administrators was not a significant predictor (p. $\leq$.10) of the number of elite athletes in Manitoba (beta value = .00008289). With all other variables held constant, for every one dollar increase in the expenditure for administrative and salary costs of paid administrators, there was an inconclusive effect on the predicted number of elite athletes in Manitoba.

5) The expenditures for elite development were significant predictors (p. $\leq$ .0009) of the number of elite athletes in Manitoba (beta value = .0000581 1). With all other variables held constant, for every $10,000 dollar increase in the expenditure for elite development, there was a corresponding .58 person increase in the predicted number of elite athletes in Manitoba.

6) The number of registered members of the sport association was a significant predictor (p. $\leq$ .0001) of the number of elite athletes in Manitoba (beta value = -.002). The importance of the negative beta value is that with all other variables held constant, increased participation would dilute the existing resources and lead to a decrease in the number of elite athletes.

7) The number of people on the volunteer board of directors was a significant predictor (p. $\leq$ .0008) of the number of elite athletes in Manitoba (beta value = .37). With all other variables held constant, for every one person increase in the number of people on the volunteer

board, there was a corresponding .37 increase in the estimated number of elite athletes in Manitoba.

8) Dummy variable analysis indicated that speed skating did the best job of producing elite athletes in Manitoba with the available resources. Squash, judo, athletics and figure skating did an average job of producing elite athletes in Manitoba given the available resources, and racquetball, handball, diving, wrestling, gymnastics, and swimming, performed below average in producing elite athletes in Manitoba with the available resources.

9) Lottery revenues had an overall positive significant effect (through the elite development variable) on the production of elite athletes in Manitoba due to the reliance of the sport associations on lottery revenue for their elite development expenditures. Further analysis into the effects of increased lottery revenues (over a two year time period from the signing of the 1984 lotteries agreement) was inconclusive.

Some Recommendations for Future Research

The following suggestions for future research were based on the results of this study as well as events experienced during this project:

1) The natural extension of this study would be to compare these results with a sample of sports that were previously exempted due to environmental or geographical biases to see if the biases were factors in the production of elite athletes.

2) Another approach would be to breakdown the variables used in this study into their different aspects. For instance, use the

expenditures for coaches, athletes, and officials separately in the model, or the number of competitive athletes in the association.

3) Employ new variables (such as Frisby's (1986) career stability or paid professionalism), in addition to the existing ones, to see the effects on the the number of elite athletes produced. New variables would include both the regressors (independent variables) and the dependent variable.

4) Use additional dummy variables, coupled with the existing dummies, to assess other factors in amateur sport such as presence or absence of a provincial coach or technical director. In other words, if the sport has a technical director, code the dummy variable with the value one, otherwise, use a zero. The resulting regression would indicate whether or not the presence of a technical director had a significant effect on the production of elite athletes.

5) In the future, once a sufficient body of data had accumulated, try again to assess the effects of increased lottery revenues on successes in elite athletes through the method attempted in this study.

6) Inter - provincial comparisons can be made using an regression models similar to the one used in this study. Every province has some sort of ranking system for its elite athletes, therefore, the dependent measures would be the same. Further, select similar regressors and perform the regression to see if significant differences exist between sports in other provinces. Once results from other provinces are obtained, then comparisons between provinces can be made that are free of subjective biases.

7) Repeat the entire procedure to assess the participative elements of amateur sport associations in Manitoba. The focus here would be on determining the cumulative and independent effects of selected factors on some other relevant dependent measure (such as number of registered members). Once obtained, results of this study could be compared with the results generated from a participative study to determine if any discrepancies that developed warranted future consideration.

Summary

This exploratory study used an ex post facto approach to studying the effects of expenditures for elite development and salaries for paid administrators as well as certain administrative costs, membership, and the size of the volunteer board of directors, on the number of elite athletes in Manitoba. A sub-problem that was addressed was whether suggestions for improvements on the information gathering and delivery systems of the sport associations could be made.

Results were generated by the use of an regression model which employed a multiple linear regression equation. The resulting regression of the number of elite athletes on the four regressors was significantly different from zero. The coefficient of determination generated from the data used in this study indicated that 90% of the variance in the number of elite athletes in Manitoba was accounted for by a combination of the four regressors. This represented the cumulative effects of the four regressors on the dependent variable. The independent effects observed were that the expenditures for elite

development and the number of people on the volunteer board were positive, significant predictors of the number of elite athletes in Manitoba. Registered membership was also a significant predictor of the number of elite athletes in Manitoba, however, the effect was negative. Expenditures for salaries of paid administrators and certain administrative items was not a significant predictor of the number of elite athletes in Manitoba.

Dummy variables were used to determine which sports were better at producing elite athletes given the available resources and to assess the effects of lottery revenues on the production of elite athletes. Of the eleven sports used in this study, speed skating did the best job of producing elite athletes with the available resources, four sports (athletics, figure skating, squash, and judo) were average in their performance, and six other sports (handball, swimming, gymnastics, racquetball, wrestling, and diving) performed below average in the production of elite athletes. Increases in lottery revenues that were incurred subsequent to the signing of the lottery agreement in 1984 were inconclusively related to the number of elite athletes in Manitoba. However, the overall effect of lottery revenues on the production of elite athletes was significant through the use of lottery money for elite development. Recommendations were made for improvements in the information gathering and delivery systems of the sport associations as well as for future research.

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Appendix A

1987/1988 Athletic Assistance Program Guidelines

All eligible athletes are expected to:

1. Be on annual training and competitive programs which are monitored by their provincial sport association (p.s.a.).

2. Participate in their p.s.a.`s appropriate provincial team program (where applicable) and must compete only for the Province of Manitoba in interprovincial competitions.

3. Be accountable to their p.s.a. with regard to maintaining appropriate training, performance and financial records.

4. Be a Canadian citizen or have landed immigrant status and be a resident of Manitoba for at least a six months prior to the application date.

5. Be a member of their appropriate provincial sport association.

6. Be willing to participate in prescribed tests for determining the use of non-medically prescribed and/or banned substances.

The funding criteria for both team and individual sports is as follows:

Team Sports

This includes the traditional team sports plus individual sports where three or more athletes join together to compete as a team.

1. $1,000 grant to a member of a national sport association "A" team playing/competition roster at the athlete`s appropriate age level. National team must represent Canada at a major international competition.

Note: Sport Canada`s Game Plan carded athletes are eligible for a maximum of $500 in athletic assistance.

2. $500 grant to a member of national sport association "A" team training roster or national "B" team.

3) $250 grant to athletes that are invited to a final tryout camp for a national sport association's national high performance program/team.

Individual sports:

This includes the traditional sports where individuals compete against one another plus sports where athletes compete together as a pair.

1. $1,000 grant to: a) Member of a national sport association "A" team roster at athlete`s appropriate age level. National team must represent Canada at a major international competition. b) Finisher in first, second, or third place at their national championship where a minimum of six provinces competed and ten competitors entered the individual event. c) Finisher in first place n the Canada Games.

2. $500 grant to: a) Member of a national sport association "B" team roster at the athlete's appropriate age level. National team must represent Canada at a recognized international competition. b) Finisher in fourth, fifth, or sixth place at their national championship where at minimum of six provinces competed and twelve competitors entered the individual event. c) Finisher in second or third place at the Canada Games.

3. $250 grant to: a) Finisher in seventh or eighth place at their annual national championship where a minimum of six provinces

competed and sixteen competitors entered the individual event. b) Finisher in first place at a recognized annual regional championship (eg. Western Canadians) where a minimum of three provinces and six competitors entered the individual event.

Appendix B

Data used in Regression Analysis

Sport	Year	Elite Development	Membership	Volunteer Administrators	Salary	Admin Plan	Man
Squash	1983	5718	2500	14		10339	6
Squash	1984	6716	2750	16		9815	8
Squash	1985	9643	3000	16		12468	5
Squash	1986	20626	3750	18		20438	4
Squash	1987	24648	4250	24		25322	9
Judo	1983	10668	400	8		2591	10
Judo	1984	17323	420	8		3166	11
Judo	1985	29245	450	8		2852	8
Judo	1986	51231	500	8		3124	8
Judo	1987	48874	525	8		3297	10
Racquet	1983	6119	600	14		11102	2
Raquet	1984	2730	650	15		13331	2
Raquet	1985	3733	520	16		14184	0
Raquet	1986	11134	416	14		18615	5
Raquet	1987	17128	489	18		13633	6
Handball	1983	4458	124	16		5159	1
Handball	1984	2308	125	16		3375	3
Handball	1985	4590	100	16		2840	1
Handball	1986	5528	100	13		3129	3
Handball	1987	5748	100	16		3470	6
Athletics	1983	50788	1200	28		32199	20
Athletics	1984	50490	1355	32		36533	19
Athletics	1985	47233	1550	27		33928	15
Athletics	1986	79931	1750	32		38914	25
Athletics	1987	102081	1948	29		45090	20
Figure	1983	23773	6700	25		40585	5
Figure	1984	17713	6850	25		35537	5
Figure	1985	13632	7000	25		29256	3
Figure	1986	38511	7149	25		20899	6
Figure	1987	45907	7295	25		33089	2
Diving	1983	11721	80	11		9977	6
Diving	1984	17447	70	11		10645	8
Diving	1985	19001	120	12		11007	9
Diving	1986	49271	125	15		12485	8
Diving	1987	56429	542	16		12138	8
Gym	1983	18393	2360	40		21263	2
Gym	1984	15501	2784	40		20240	3
Gym	1985	39063	2717	40		26236	6
Gym	1986	107731	3500	40		31055	6
Gym	1987	89713	4268	40		36624	7

Wrestle	1983	25769	250	9	5802	3
Wrestle	1984	22172	250	10	3736	3
Wrestle	1985	22293	350	12	3971	5
Wrestle	1986	25777	700	10	9007	5
Wrestle	1987	64975	750	11	11269	11
Swim	1983	22253	625	10	27230	4
Swim	1984	39088	698	10	22332	1
Swim	1985	40536	759	10	34426	5
Swim	1986	48330	596	10	34810	5
Swim	1987	44267	587	10	41940	5
Speed	1983	15480	223	16	8252	14
Speed	1984	14403	205	16	9154	13
Speed	1985	12143	250	16	12143	17
Speed	1986	31820	255	16	14413	17
Speed	1987	31066	258	16	27460	15