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EXPLORATION OF THE VALIDITY AND USEFULNESS OF AN INTEGRATED PERFORMANCE INDICATOR FOR POSTGRADUATE SCHOLARSHIP PROGRAMS

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Abstract: Performance indicators used to evaluate postgraduate scholarship programs in the natural sciences and engineering are usually long-term in nature and focus on such measures as time to completion, employment status, employment sector, and annual income. These measures are time-consuming and costly to collect and analyze. The information provided by these measures, therefore, should truly be useful to both program staff and senior managers responsible for administering these programs. Based on an earlier study conducted by two Canadian researchers, this article presents the results of a study on the validity of an integrated indicator for postgraduate scholarship programs. The findings of the study reveal that the integrated indicator offers no added value compared to traditional survey analysis. The article concludes with some suggestions for future performance measurement studies.

Résumé: Les mesures de rendement utilisés lors de l'évaluation de programmes de bourses aux études supérieures en sciences naturelles et en génie portent habituellement sur les effets à long terme de tels programmes, mesurant le délai d'exécution, les emplois obtenus, le secteur d'emploi, et le salaire des récipiendaires. Ces mesures impliquent des coûts importants en terme de temps, de collecte de données, et d'analyse. L'information produite par de telles mesures se doit donc d'être utile tant aux agents de programmes qu'à la haute gestion responsable de l'administration de ces programmes. Cet article, basé sur une étude antérieure réalisée par deux chercheurs canadiens, présente les résultats d'une étude portant sur la validation d'un indicateur intégré pour des programmes de bourses aux études supérieures. Les constatations de l'étude démontrent que l'indicateur

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intégré n'a pas fait preuve de valeur ajoutée comparativement à une analyse traditionelle des résultats d'un sondage. Quelques pistes de recherche au sujet de la mesure du rendement sont suggérées en guise de conclusion.

The federal government of Canada has been moving from rules-focused management practices to more citizen-centred public administration through various initiatives. One of the best-known initiatives in this area, *Results for Canadians* (2000), proposes the use of Results-based Management (RBM) as the mechanism through which this can best be achieved. Results-based Management focuses on the measurement of progress toward sought-after results, or outcomes, and modifying program design and operations based on the measures obtained. This approach is meant to improve the accountability of public institutions while providing useful information to those managing the programs in question (Jorjani, 1998).

Managing for results requires a comprehensive system of performance measurement and program evaluation. Taken together, these types of measurement activities provide a clear picture of a program's progress toward predetermined outcomes. Performance measurement is defined as the ongoing, regular measurement of performance indicators and focuses on the early outcomes of a program, policy, or initiative. Program evaluation refers to in-depth, periodic studies conducted to answer the broader questions facing a program and to address longer-term impacts. Performance measurement feeds into program evaluation by providing ongoing data on expected outcomes.

Performance measurement has long been the object of critiques and debates. In the first of a series of articles on the subject, Perrin (1998) traces current performance measurement initiatives to past undertakings of a similar nature and argues that when used in isolation, performance measures are often irrelevant and reward the wrong activities. In a later article, he specifies that the appropriate role of performance measurement within the larger framework of program evaluation needs to be further studied, and that alternative approaches to performance measurement need to be developed and tested (Perrin, 1999). In a related article, Feller (2002) notes that the types of outputs and outcomes produced by an organization have a significant impact on its ability to measure performance. He states that research and higher education institutions, compared to other types of organizations, often have broad, long-term objectives and must keep a flexible approach in their programming to suit the needs

of researchers. In other words, universities must continually adapt existing programs to respond to the needs of students and researchers while maintaining a strong focus on their long-term objectives. Feller further explains that performance measurement activities in universities often involve the selection of performance indicators based on the availability of certain forms of data rather than because the data reflect useful and important information needed for decision-making. This may lead to difficulties in performance measurement and reporting.

Another issue related to performance measurement, identified by Scheirer (2000), is the simplicity with which performance data are analyzed. Most often, data analysis consists of reporting descriptive data for each performance indicator. She argues that a more complex study of the relationships that may exist between indicators is more likely to yield information considered useful by decision-makers.

The quality of the performance data collected for any program is therefore critical to their usefulness to managers and other stakeholders. Performance measures should focus on the information that is most relevant for decision-making and should be cost-effective. In other words, good performance measures yield important information, are relatively easy to measure, and lend themselves to sophisticated analysis if necessary.

The study presented here explored the validity and usefulness of a mechanism through which a number of simple performance measures were combined into one general indicator. It was hypothesized that the creation of this "integrated indicator" would provide a more comprehensive picture of how a given program is performing, and may thus be of use to program managers and staff charged with its delivery. The study was conducted using data from a postgraduate scholarship program administered by the Natural Sciences and Engineering Research Council (NSERC), a Canadian federal government agency that supports university research and the training of Highly Qualified Personnel (HQP). Although there is a substantial body of knowledge on the measurement of the outcomes of undergraduate financial support programs, very few studies have focused on the measurement of the outcomes of postgraduate support programs. This study therefore adds to the available knowledge on how best to measure the outcomes of such programs, and its findings may be of use to evaluators or program staff working in the field of higher education or research training.

OUTCOMES OF POSTGRADUATE FINANCIAL SUPPORT

Past studies on postgraduate financial support programs have typically focused on early program outcomes such as time to completion or degrees awarded. A number of authors have focused on the contribution of demographic, academic, and financial factors on the time taken to complete masters' and doctoral degrees (Sheridan & Pyke, 1994). Other studies, such as those led by Abedi and Benkin (1987) and Tuckman, Coyle, and Bae (1989), focus mainly on the type of financial support provided to postgraduate students and its impact on time to completion and degrees awarded. There appears to be no consensus in the literature as to whether scholarships or stipends result in more favourable outcomes for recipients (stipends are salaries paid to students from a researcher's grant and can take the shape of teaching or research assistantships). None of the studies reviewed focused on longer-term program outcomes, such as the type of employment obtained by scholarship or stipend recipients once they graduate.

In a more comprehensive study, Dussault and Manseau (1997) provide an overview of the indicators that have been used for examining the outcomes of postgraduate scholarship programs. In developing a framework for their study, these authors note that the models used in measuring outcomes for undergraduate student support do not apply to postgraduate student support, as the two types of support do not share common objectives. According to Dussault and Manseau, the basic objective of scholarships for students at the postgraduate level is not to provide access to university as it is for the undergraduate level, but to produce a highly qualified workforce in specific disciplines. In their own work, they focused on these types of outcomes, such as whether the diploma for which the scholarship had been granted was awarded, whether the recipient had found employment, whether their position was related to their field of study, and whether the recipient was still studying. By focusing on longer-term outcomes, Dussault and Manseau looked beyond the more typical variables found in other studies.

Dussault and Manseau (1997) hypothesized that a linear combination of the outcome variables cited above would provide a useful, general indicator of a postgraduate scholarship program's performance, regardless of the university or field of study in which it was held. Their methodology focused on compiling postgraduate survey results from a number of Canadian and American granting agencies (including NSERC) and developing what they named an "inte-

grated indicator" to obtain an overall value used to compare the results of these different surveys. They argued that the integrated indicator would allow evaluators to compare the performance of several postgraduate scholarship programs at once, thus providing a sense of the merit and worth of each of these programs. The authors concluded that the integrated indicator could be a useful means of comparing the impacts of postgraduate scholarship programs.

Beyond the immediate application of the integrated indicator as a comparator between similar programs, however, Dussault and Manseau's work offers some interesting possibilities for the measurement of postgraduate financial support programs. This study aims to examine the validity of the integrated indicator and its usefulness and value-added as a performance measure. If found to be valid and useful, the integrated indicator could be used as a comprehensive performance measure for postgraduate support programs.

RESEARCH QUESTIONS AND HYPOTHESIS

This study therefore posed the following questions: Does the integrated indicator developed by Dussault and Manseau (1997) represent a valid and useful performance measure for postgraduate scholarship programs? More specifically, can it provide program managers and evaluators with a way in which to monitor a postgraduate scholarship program's performance beyond the measures and analyses available through traditional data analysis methods?

Dussault and Manseau's integrated indicator appeared to offer some added value as a combined performance measure for postgraduate scholarship programs. It was therefore hypothesized that the integrated indicator would move beyond the traditional offerings of standard survey analysis and provide the means through which an overall assessment of a program's progress toward its intended outcomes would be made possible.

METHOD

Sample and Instruments

Data for the present study were collected as part of two questionnaire surveys conducted by NSERC for program monitoring purposes. The first survey, called the *Postgraduate Scholarship Survey*

(PGS Survey), has been conducted by NSERC on an annual basis since 1994. Former NSERC scholarship recipients were surveyed nine years after receiving a PhD scholarship to obtain data on program impacts. It was estimated by NSERC officials that a time lag of nine years would be sufficient for recipients to complete their doctoral studies and start their careers. Questionnaire data for the 1988 cohort were therefore retained for the study (n = 218).

The second survey, called the *Stipend Recipient Survey*, focused on stipend recipients from NSERC's Research Grants Program and was conducted in 1997 to establish comparative data between students who received a postgraduate scholarship and those who were supported through grants awarded to faculty members. One hundred thirty-six (136) questionnaires were returned in usable form.

A report summarizing the findings of each survey was prepared by NSERC staff (NSERC, 1999), and a further analysis was conducted to identify potential differences in outcomes between PGS recipients and stipend recipients. No differences were found in this analysis. Both surveys were used in the present study to resemble a prior comparative study undertaken by NSERC staff in 1999, described in the following section.

Data Analysis and Interpretation

Data preparation first involved comparing the variables used in the integrated indicator by Dussault and Manseau (1997) and those found in the NSERC surveys. The variables included in the integrated indicator were readily available in both NSERC surveys, with the exception of "job obtained is related to field of study." This variable was substituted in the analysis with a proxy, "importance of graduate studies to career," which measures the perceived need for graduate studies in the career plans of the respondent (see formula below).

Data analysis was conducted in two phases and was based on the hypothesis formulated from the research question.

Variables

The unit of analysis for the study was the individual respondent for each of the surveys (i.e., the PGS group and the stipend group). The raw data from each of the two surveys were used to calculate each element of the formula (the variables were nominal and dichotomous;

the limitations of this type of variable are discussed in a later section); these are expressed as the percentage of positive responses. The details of how each variable was obtained are presented in Table 1.

Table 1
Variables Included in Integrated Indicator

Variable Name	Survey Question	Responses and Codes
Awarded Diploma (AD)	Did you complete the degree for which you received NSERC scholarship support? (PGS Survey) Did you complete the degree for which you received financial support from your supervisor's NSERC grant? (Stipend Survey)	0: No 1: Yes
Importance of Graduate Studies to Career (IGS)	In your opinion, how important was graduate training to your career?	0: Not important 1: Beneficial or essential to career
Obtained Job (OJ)	Your current status is? - Employed - Self-employed - Unemployed - Postdoctoral fellow - Student	0: Unemployed or student 1: Employed, self-employed or postdoctoral fellow
Pursuing Studies (PS)	Your current status is? - Employed - Self-employed - Unemployed - Postdoctoral fellow - Student	0: All other categories 1: Student

Calculation of the Integrated Indicator

The integrated indicators for the postgraduate scholarship program and the student stipends were calculated based on the formula developed by Dussault and Manseau (1997), adapted to the NSERC survey data. The revised formula is presented and described below:

$$I = (AD + IGS + OJ + (100 - PS)) / n$$

where:

I = integrated indicator
AD = awarded diploma
IGS = importance of graduate studies to career
OJ = obtained job
PS = pursuing studies

The adapted formula is therefore an equally weighted average of the element variables (AD, IGS, OJ, and PS) that make up the integrated indicator. The first level of analysis consisted of calculating the mean value of each of the elements and entering those values into the adapted formula to obtain the value of the integrated indicator.

The indicators for AD, IGS, and OJ received positive values because they generally reflect the objectives of the PGS program and refer to favourable outcomes for the student. The variable for pursuing studies (PS) was assigned a negative value in the original formula developed by Dussault and Manseau (because pursuing further studies implies that the scholarships or stipends did not result in favourable outcomes), and was treated as such in the revised formula.

Table 2 summarizes the mean and standard deviation calculated for each of the element variables, as well as for the integrated indicator. The means of the first three element variables (AD, IGS, OJ) can be interpreted as the proportion of respondents who indicated a positive response on the survey for these items. The mean of PS variable can be interpreted as the proportion of respondents who indicated that they were not pursuing studies on the survey. The value stated for the integrated indicator means corresponds to the arithmetic mean of the element variables.

Table 2
Mean and Standard Deviation of Element Variables and Integrated Indicator

Funding Mechanism (survey)	Awarded Diploma (AD) $n = 352$		Importance of Graduate Studies (IGS) $n = 348$		Obtained Job (OJ) $n = 344$		Pursuing Studies (PS) $n = 344$		Integrated Indicator $N = 337$	
	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
Scholarship	.98	.15	.98	.15	.94	.23	.98	.15	.97	.004
Stipend	.96	.19	.99	.09	.92	.28	.98	.12	.97	.004
Difference in proportions	.02		.01		.02		.00		.002	

A cursory examination of the means and standard deviations presented in Table 2 reveals very little difference among the elements making up the integrated indicator and between the scholarship and stipend funding mechanisms. This latter observation is in line with

a comparative analysis conducted by NSERC staff in 1999. The analysis concluded that, in general, the outcomes reported by scholarship recipients were not statistically different than those reported by stipend recipients. The study compared a number of independent variables measured for each of the two groups (scholarships and stipends) using survey questionnaires and found no statistically significant differences between the two groups. Because the use of nominal variables in the integrated indicator precludes parametric testing, two non-parametric tests were used in order to determine whether differences could be found between the two groups on the element variables as well as on the integrated indicator. The Mann-Whitney test and the two-sample Kolmogorov-Smirnov tests were applied to the data, and no significant differences were found (α = 0.05), which supports the conclusions reached in the earlier study.

The integrated indicator formula seems to provide little information on the outcomes of postgraduate scholarship programs beyond that obtained through traditional survey analysis methods. This could be due to a number of factors related to the quality of the data collected; these factors are outlined in the discussion section of this article. It is also possible that the similarity observed between the element variables and between the two funding mechanisms may be related to correlation between the variables. Because the integrated indicator is an equally weighted arithmetic mean of the four element variables, the existence of mixed positive and negative correlations between pairs of the element variables may obscure an overall difference between recipient groups as measured by the integrated indicator. In other words, a positive correlation between Awarded Diploma and Obtained Job may hide the effect of a negative correlation between Obtained Job and Pursuing Studies, which could be critical in identifying differences between recipient groups. The data obtained for the scholarship and stipend recipients were combined and analyzed together in order to verify this new hypothesis. A Phi-coefficient analysis was therefore conducted on the elements forming the integrated indicator; the results of this analysis are presented in Table 3.[1]

It appears that the "Obtained Job" element is somewhat correlated to the "Pursuing Studies" element, although the association is not very strong (0.54).

In order to determine the reliability of the integrated indicator, the coefficient alpha was calculated for the element variables and the

integrated indicator. The four items obtained a coefficient alpha of 0.35, which signifies that there is low internal consistency between the items. This illustrates the fact that the outcomes being measured by the integrated indicator do not lend themselves well to being grouped in this way.

Table 3
Correlation Analysis Results (Phi Coefficient)

Element		Awarded Diploma (AD)	Importance of Graduate Studies (IGS)	Obtained Job (OJ)	Pursuing Studies (PS)
Awarded Diploma	Phi value		–.02	.02	.10
	Std. error		.01	.06	.11
	N		346	343	343
Importance of Graduate Studies	Phi value			.05	–.02
	Std. error			.08	.01
	N			338	338
Obtained Job	Phi value				.54*
	Std. error				.09
	N				344

* $\alpha = 0.05$

In their original presentation of the integrated indicator formula, Dussault and Manseau (1997) recommend additional element variables that could provide evidence that postgraduate scholarship programs contribute to the training of qualified research professionals. These additional variables include the sector in which the respondents were employed (industry, university, or other) as well as the main activities of their job (teaching, health care, consulting, sales, research, management, or product development). In light of the fact that the integrated indicator did not provide any added value compared to traditional survey data analysis, a second phase of analysis was undertaken to assess whether these additional variables could be included in a revised version of the formula. The additional variables were thus cross-tabulated by funding mechanism in order to get a better sense of the distribution of university researchers/teachers, industry researchers, and others. Table 4 summarizes the distribution of this variable for each of the funding mechanisms.

Data analysis reveals that university researchers made up about one quarter of all respondents (regardless of funding mechanism)

and that industry researchers accounted for slightly more of the same group. A chi-square analysis was conducted to assess the usefulness of the additional variables in identifying associations between the funding mechanisms and the career path identified by respondents. No significant associations were found (χ^2 (2,347) = 1.068, p = 0.55). Although no major differences were found between the groups in this specific example, the inclusion of the "employment sector" and "activity" variables to the integrated indicator may add an interesting dimension to the indicator in future studies and provide more complete information on whether or not the programs are addressing their main objectives. More work will be required to determine how these elements can be added to the formula.

Table 4
Cross-tabulation of Career Variable by Funding Mechanism

		Career Path			
Funding Mechanism		University Research/Teaching	Industry Research	Other	Total
Stipend	Count	38	37	59	134
	% of total	28.4%	27.6%	44.0%	100%
Scholarship	Count	50	61	102	213
	% of total	23.5%	28.6%	47.9%	100%
Total	Count	88	98	161	347
	% of total	25.4%	28.2%	46.4%	100%

DISCUSSION

Dussault and Manseau's (1997) proposed integrated indicator offered an interesting method for comparing the performance of various postgraduate scholarship programs and, by so doing, providing a statement of whether such programs are achieving their intended outcomes. The goal of this study was not to compare the performance of postgraduate scholarship and stipend programs, but to assess the validity and usefulness of the integrated indicator as a performance measure in and of itself. Compared to a survey analysis conducted on a variable-by-variable basis, the integrated indicator does not offer added value to evaluators and program managers. In fact, the integrated indicator is less useful than a more traditional analysis, because it requires dichotomous data rather than scale or interval data. This use of dichotomous data invariably skews the distribution and makes the use of parametric tests inappropriate.

The correlations found between certain element variables point to the fact that the integrated indicator may also obscure the true impact of each element variable. This significantly reduces the usefulness of the integrated indicator as a performance measure, since key pieces of information may be lost due to the equal weightings used in the formula. In addition to this, the low internal consistency found between the element variables may indicate that the integrated indicator does not actually measure a unified construct, and so is no more useful than its constituent parts.

In addition to these problems, the fact that the surveys rely solely on self-reporting (i.e., the recipients of the scholarships or stipends are asked questions directly about the impact of the funding on their schooling and subsequent careers) may be of concern in terms of the validity of the data being collected, regardless of how they are analyzed. Also, the ceiling effect that can be seen for each of the variables (i.e., almost all of the element variables have frequencies that are close to 100%) may contribute to the lack of validity of the formula. The NSERC example used in this study highlights these issues, which illustrate an often-cited deficiency of quantitative performance measurement approaches. As explained by Perrin (1998), performance measures, when used in isolation, are not appropriate for assessing such things as program outcomes or resource allocation. They tend to reduce a program to a small number of indicators, as seen in this study, which can obscure the real impacts of the program, intended or unintended. In other words, the methods used to analyze performance measures can have a significant influence on the identification and description of a program's progress toward its outcomes. However, performance measurement systems such as the integrated indicator potentially can play an important role in results-based management by providing ongoing, timely information that can then be analyzed within the context of an in-depth, periodic program evaluation (Bernstein, 1999; Perrin, 1998; Wholey, 2001), when they are found to be valid and reliable.

Results-based management and its focus on outcomes poses a particular methodological challenge to program managers and evaluators charged with measurement in many areas of public service delivery (Newcomer, 2001). If done properly, performance measurement serves an important role and provides an interesting framework within which multiple lines of evidence can be drawn for a comprehensive view of a program's effectiveness. When program managers have access to a constant stream of data on what their

program is accomplishing, they are more likely to ask why these outcomes have occurred and how the performance of the program can be improved (Wholey, 2001). To achieve this level of synergy between performance measurement and program evaluation, more research is needed on the appropriateness of performance measures in various contexts, and on their contribution to the overall judgement of merit and worth of a program.

CONCLUSION

The study described here does, in the end, contribute to a better understanding of the role of performance measures such as the integrated indicator in the assessment of a program's long-term outcomes. The results of the study suggest that by itself, the integrated indicator would not be appropriate for monitoring the long-term outcomes of postgraduate funding support programs such as NSERC's Postgraduate Scholarships Program or its stipend funding mechanism. If further refined, the integrated indicator may provide a good sense of whether certain trends are maintained throughout the years (if the integrated indicators for multiple PGS cohorts are compared). As suggested by Scheirer (2000), the usefulness of performance measurement lies not only in the descriptive data collected, as summarized by the integrated indicator, but also in the analysis of the relationships that may exist between the variables that make up the performance measurement system in question. This study therefore provides an interesting direction for further exploration of the role of performance measurement and how to make the most out of such initiatives. Suggestions for future studies include: varying the weightings of the elements that make up the integrated indicator in order to assign more importance to critical variables in the formula; collecting interval or ratio data on the surveys to increase the sensitivity of the statistical tests used to validate the formula; and studying the correlations that exist between some of the elements in more depth, to identify instances in which there is double-counting of the same effect. Other interesting areas for future study include conducting factor analyses or applying item response theory techniques to look at the extent to which the integrated indicator measures a consistent construct. Ideally, a performance measure such as the integrated indicator would not be based solely on self-reporting; perhaps future studies could also look at other types of variables that could be included in the integrated indicator and that would not rely on survey findings, such as occupational data or university graduation records.

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NOTE

1. The Phi coefficient is a measure of association between two binary variables and is interpreted in a similar fashion to that of a correlation.

REFERENCES

Abedi, J., & Benkin, E. (1987). The effects of students' academic, financial and demographic variables on time to doctorate. *Research in Higher Education, 27*, 3–14.

Bernstein, D.J. (1999). Comments on Perrin's "Effective use and misuse of performance measurement." *American Journal of Evaluation*, *20*, 85–93.

Dussault, F., & Manseau, A. (1997). Pitfalls in the assessment of post-graduate scholarship programs: The need for new indicators. *Canadian Journal of Higher Education, 27*, 91–112.

Feller, I. (2002). Performance measurement redux. *American Journal of Evaluation, 23*, 435–452.

Jorjani, H. (1998). Demystifying results-based performance measurement. *Canadian Journal of Program Evaluation, 13*(1), 61–95.

Natural Sciences and Engineering Research Council. (1999). *Comparison of the Postgraduate Scholarship (PGS) and Postgraduate (PG) surveys*. Internal document.

Newcomer, K.E. (2001). Tracking and probing program performance: Fruitful path or blind alley for evaluation professionals? *American Journal of Evaluation, 22*, 337–341.

Perrin, B. (1998). Effective use and misuse of performance measurement. *American Journal of Evaluation, 19*, 367–379.

Perrin, B. (1999). Performance measurement: Does the reality match the rhetoric? A rejoinder to Bernstein and Winston. *American Journal of Evaluation, 20*, 101–111.

Scheirer, M.A. (2000). Getting more "bang" for your performance measures "buck." *American Journal of Evaluation, 21*, 139–149.

Sheridan, P.M., & Pyke, S.W. (1994). Predictors of time to completion of graduate degrees. *Canadian Journal of Higher Education, 24*, 68–88.

Treasury Board of Canada. (2000). *Results for Canadians: A management framework for the Government of Canada*. Retrieved February 16, 2005, from <http://www.tbs-sct.gc.ca/res_can/rc_e.asp>.

Tuckman, H.P., Coyle, S., & Bae, Y. (1989). The lengthening of time to completion of the doctorate degree. *Research in Higher Education, 30*, 503–516.

Wholey, J.S. (2001). Managing for results: Roles for evaluators in a new management era. *American Journal of Evaluation, 22*, 343–347.

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