

**DRIVERS OF COMPENSATION OF HEADS OF
PROCUREMENT UNITS, SUPERVISORS, AND MATERIALS
MANAGERS IN THE PUBLIC SECTOR**

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ABSTRACT. This article examines the determinants of salaries of heads of public procurement units. Specifically, it investigates the effect of gender, budget size, supervisory responsibilities, experience, authority level, education, certification, age, cost of living and labor market competition on the compensation of purchasing supervisors and heads of purchasing units. The article uses multiple linear regression and analysis of variance to conclude that drivers of compensation of public procurement executives and managers in the public sector are different than those in the private sector or in other industries.

INTRODUCTION

Lack of resources and stakeholder confidence are becoming increasingly important for public agencies (Martin & Kettner, 1996, p. 1). In the 1990s, growing economic pains and public hostility toward non-elected officials are creating new pressures on public organizations. Public organizations are expected to do more for less (Germond & Witcover, 1993). This need to do more for less translates into a need for economic efficiency and quality management of public services at the same time. Public purchasing managers face this need head-on. They are the head of the spear when it comes to service and product acquisitions. Therefore, it is extremely important that these managers be compensated appropriately.

Compensation studies are important for two main reasons. First, they increase the ability of agencies to recruit quality managers through

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assigning competitive compensation (Igalens & Roussel, 1999). Second, compensation studies provide current purchasing managers with a benchmark of compensation for their professional cohorts.

Investigating the determinants of wages and levels of compensation is essential to the development of fair and competitive wage systems. There are many studies that deal with different drivers of wage determination. However, most of these studies deal with the private sector, and are often associated with stock performance and profits collected by firms. Such studies rarely deal with the public sector, which is consistent with Thai's (2001) and Carter and Grimm's (2001) charge that public procurement is neglected in procurement research.

This article examines the determinants of salaries of heads of procurement departments and purchasing supervisors and materials managers in various public sector agencies. Specifically, it investigates the effect of gender, budget size, supervisory responsibilities, experience, authority level, education, certification, age, cost of living and labor market competition on the compensation of purchasing supervisors and heads of purchasing units. The article first examines the literature surrounding each of these determinants. Second, it develops a model to be tested. The third section explains the methodology that is used to test this mode. The fourth section deals with the results of the data collection and analysis. Finally, the article discusses limitations and implications of the findings of this study.

LITERATURE REVIEW

The type of work and the level of authority assigned to managers help to a great extent in determining their compensation levels. Studies across different occupations, industries, and levels point to different compensation drivers. Business discipline, possession of a doctoral degree, and academic rank are the main determinants of salaries of full-time professors at public universities (Yeh, Sawanakul & Lim, 1998). Yeh, Sawanakul and Lim reached this conclusion after their study of 209 instructional faculty members at public universities. Several other indicators, such as years of service, race, gender, and college from which they graduated, had less effect on faculty salary determination. Affiliation with other networks of hospitals seems to affect the salaries of chief executive officers of hospitals (Santerre & Thomas, 1993). Size of

the hospital, geographic location, and several human capital measures also drive the salaries of hospital executives (Santerre & Thomas, 1993).

In a study of 3,400 firms, Holzer (1990) found that previous job experience and current job term (years in current position) have positive effects on wages and productivity of employees while hours of training and gender have less effect. Langer (2000) determined that the best-paid private company executives have twenty-five or more years of experience. The size of the company, supervisory responsibility, geographic location, education, and length of experience also contribute to determining the salaries of chief financial officers of companies (Langer, 2000).

In a study that is closest in scope to that undertaken in this article, Ogden, Zsidisin and Hendrick (2002) surveyed 645 chief purchasing officers (CPO) of Fortune 500 companies. Using logistic regression analysis of the 165 responses, they found that type of industry, sales volume, spending as a percentage of sales, total number of people reporting to the CPO, levels between CPO and chief executive officer, years of non-purchasing experience, and age are the main drivers of compensation levels in the private sector. They also found no significant effect of years of purchasing experience, gender, education and holding a Certified Purchasing Manager (CPM) certificate on compensation levels. One of the limitations of the Ogden et al. study is its external validity when it comes to public sector purchasing officers. The study neither takes into consideration the effects of cost of living nor labor market competitiveness on the compensation of purchasing managers.

In summary, most of the previous studies on compensation either deal with non-procurement staff, or when they deal with procurement staff, they focus on the private sector. This article reviews these studies in reference to the possible effects of several factors on compensation in general, on compensation of purchasing managers, and on compensation of purchasing managers in the public sector.

Industry

Leenders and Fearon (1997) argued that the type of industry affects compensation of heads of purchasing units. Ogden et al., (2002) found that industry type affects compensation of chief purchasing officers in private industry. Chief purchasing officers in service industries are likely to make less money while those in manufacturing industries are likely to

make more money. This pay discrepancy among the different fields persists despite research that affirms that the tasks performed by purchasing managers in different industries do not vary tremendously (Muller, 1991). Muller looked at duties of purchasing managers in eight types of industries – two of which are public sector and one is nonprofit – and found that “there is relatively little difference in the duties of purchasers across the various areas” (p. 16). Given Muller’s argument, the persistence of salary differences across different industries suggests that compensation is driven by things other than job duties. More importantly, Ogden et al.’s (2002) research did not include any public sector purchasing officials. In the study undertaken here, type of industry is less relevant since all respondents are public sector procurement officials.

Sales and Spending

In theory, the amount of work performed by purchasing units affects the compensation of the heads of these units. Fitzgerald (1998) argues that company size influences the salaries of purchasing staff. Company size is related to sales volume and it affects the amount of spending by a company. According to Morgan (1997) and Fitzgerald (1998), spending may have an influence on the amount of compensation received by purchasing officials. Many other researchers correlate the size of the organization with determining the salary of its executives (Longer, 2000; Santere & Thomas, 1993). In a private sector organization, sales volume or revenues are distinct from expenditure. In a public organization where there are not substantial sales or revenues outside government allocations, an annual budget is the closest measure to use when it comes to the volume of sales of an organization. Annual budgets may also be used here as indicators of the size of purchasing organizations. Ogden et al. (2002) found that sales revenues are likely to have a positive effect on compensation of chief purchasing officers. They found that the effect of spending as a percentage of sales revenues also has a positive effect on compensation to purchasing officers.

Number of Subordinates

While budget and procurement volume is a measure of the financial responsibilities of purchasing managers, the number of subordinates reporting to them is a measure of their supervisory responsibilities. In their study of Fortune 500 chief purchasing officers, Ogden et al. (2002)

found that the higher the number of subordinates a purchasing head has, the higher his or her salary is likely to be. “Chief purchasing officers with more than 100 employees reporting to them are 7.0 times more likely to have above average compensation levels. Chief purchasing officers with less than 50 people reporting to them are 6.2 times more likely to have below average compensation levels” (p. 36).

This is the case not only in purchasing departments but also in many organizations. Langer (2000) found a positive relationship between supervisory responsibilities and the salaries of chief financial officers of large firms.

Levels of Management between CEO and CPO

Fitzgerald (1999) and Nolan (1999) argue that a shift has occurred from a tactical to a strategic role. This strategic role affects the place of the procurement unit in the organizational chart, and affects the reporting structure for the purchasing organization. This also affects the responsibility and accountability placed upon purchasing officials.

According to Ogden et al. (2002, p. 32), “[a]s part of this shift, many chief purchasing officers are reporting to executives at much higher levels within their organizations... Certainly, it would be perceived that those individuals who report directly to their chief executive officer would be valued more and paid more than those reporting at lower levels.” Ogden et al. (2002) also found that the fewer levels of hierarchy between the Chief Purchasing Officer and the Chief Executive Officer, the higher the salary.

Years of Purchasing Experience

Salary scales are usually related to the experience of employees. That experience is relevant when an individual is first recruited, but plays a smaller role in determining raises as one remains in that position. Experience, theoretically at least, plays some role in determining the success and wage performance of an individual. Many advertised openings have ranges that are commensurate with education and experience of job candidates. In his study of employee earnings in 3,400 firms, Holzer’s (1990) found that previous experience and current job tenure play the largest role in determining one’s salary. This study was not specific to purchasing staff, but there is no reason to believe that

purchasing departments in the private or the public sector would be any different.

On the other hand, Yeh et al. (1998) concluded in their study of 209 instructional faculty members at public universities that years of experience of faculty members had the least influence on determining their wages. In their study of 156 chief purchasing officers in various industries, Ogden et al. (2002) found no effect of the years of purchasing experience on purchasing heads' compensation levels. However, they found a relationship between general experience and compensation levels.

Therefore, three types of experiences theoretically could affect one's compensation: non-purchasing experience, purchasing experience and the number of years with current employer.

Age

It is difficult to argue that one's age will determine their wages. What is likely however is that age might act as an indicator of another concept – perhaps years of experience in the workforce. The older one is, the more years would likely have passed since that person joined the work force. Prior research has found relationships between age and salary. It has however done very little to explain the source of this relationship. Morgan (1997) found that the average salary for older purchasing professionals, particularly those between 41 and 50, was higher than that of other procurement professionals.

Ogden et al. (2002) also affirmed these findings. In the 2001 *Purchasing* magazine annual report on salaries of purchasing employees, respondents in the 41-50 age group made higher than average salaries while people in the 51-60 age group made even higher salaries than those in the 41-50 age group (“Purchasing,” 2001).

Gender

Disparity in employment opportunities and pay between men and women continues to persist despite many laws that mandate gender pay equity in the public sector (Alkadry, Nolf & Condo, 2002; Bullard & Wright, 1993; Guy, 1993; Naff, 1994). Alkadry et al. (2002) identify three types of barriers to equality in pay between men and women in the public sector. First, organizational barriers and the so-called glass ceiling act to keep women in lower echelon positions. Lower echelon positions

translate into lower pay. Second, human capital barriers hinder women's competitiveness when competing for management and executive positions. Third, social and cultural barriers involve the "resistance to the idea of women's entrance into nontraditional female occupations and into management positions, especially when those positions of authority are in male-dominated jobs or agencies" (Alkadry et al., 2002, p. 3).

The three sets of barriers focus on pay disparities resulting from barriers to women's progress into more advanced positions, certain occupations, or certain agencies. Such barriers matter less when considering pay inequity between men and women who work in similar level positions such as head of purchasing unit, supervisor, or materials manager. It is also important to note that the variance across occupations is not as much of an issue because all participants were public procurement officials and the analyses were conducted for each rank.

There are conflicting findings on the empirical studies of the effect of gender on compensation of employees. Both Morgan (1997) and Fitzgerald (1998) found a gap in salaries of male and female purchasing officials. Ogden et al (2002) found no relationship between gender and compensation levels for purchasing heads from different industries. Bearing in mind the barriers to pay equity, this article will examine the effect of gender on compensation of government purchasing managers.

Education Level and Certification

In the twenty-first century, education has come to mean many things besides degree attained or highest class completed. Education is demonstrated through additional coursework, certification or various forms of workshops. Morgan (1997) found that purchasing staff with graduate degrees earned more than those with undergraduate degrees. Ogden, Zsidisin, and Hendrick (2002) did not support this kind of relationship in their study of the responses of 165 chief purchasing officers from the Fortune 500 firms.

Many studies have addressed the extent to which certification affects career advancement (Clancarelli, 1999), job performance and satisfaction (Lumpkin & Tudor, 1991), and salaries (Morgan, 1997; Fitzgerald, 1998). Ogden et al. (2002) found no relationship between holding Certified Public Manager (CPM) and compensation levels.

Labor Market Competitiveness and Cost of Living

Agron (1996) argues that budget cuts particularly in the education system have affected the levels of compensation for administrators. He cited collective bargaining results, overall budget decisions, cost of living and competitive practices as the main drivers of salaries of school personnel. Collective bargaining results are likely to play a minimal role in determining the salaries of purchasing heads especially since most executives hold management positions and will not usually be included in collective bargaining agreements.

On the other hand, cost of living and labor market competitiveness are relevant for government purchasing employees. Employee compensation is theoretically affected by the cost of housing, transportation, taxes, and other factors. Labor market competitiveness in an area also plays a role in establishing the salaries of employees in that area. High salaries in an area will force agency heads to set high salaries. Otherwise, job candidates will be more inclined to take jobs in other organizations in the area.

CONCEPTUAL MODEL AND HYPOTHESES

In the public sector, sales volume is not very important since many agencies are service agencies. What is substantially more relevant is the amount of money spent by a given agency. However, in some cases where purchasing is decentralized, the amount of money spent by the agency does not accurately reflect the amount of responsibility in the hands of procurement employees. As a measure of spending done through the procurement division, this article uses the annual procurement volume, which is an indicator of the amount of financial responsibility in the hands of the procurement staff. The resulting hypothesis is:

H₁: As annual procurement volume increases, the compensation of the head of the purchasing unit increases.

The literature reviewed above suggests that supervisory responsibilities are likely to influence the compensation of heads of purchasing units. The number of subordinates of a purchasing department head is an indicator of how many people are supervised by that head. The resulting hypothesis therefore is:

H₂: As the number of subordinates increases, the compensation of a purchasing unit head also increases.

The literature also suggested a relationship between levels of management between the head of the purchasing department and the chief of the agencies. The resulting hypothesis is:

H₃: As the number of levels between the head of the purchasing unit and the agency head decreases, the salary of the head of the purchasing unit increases.

Experience is very important for certain positions. Two types of experiences are relevant to determining wages: experience in the purchasing field, and experience with current employer. Two hypotheses are of interest here:

H₄: As the number of years of experience in purchasing increases, the salary of purchasing unit heads increases.

H₅: As the number of years of experience with the current employer increases, the salary of purchasing unit heads increases.

The literature suggests that older executives tend to make more money than younger ones. To examine whether this applies to public procurement heads, the following hypothesis will be tested:

H₆: Older executives earn more money

Whether pay inequity between men and women is caused by a set of barriers or overt and covert discrimination, the first point to dealing with these causes is identifying that such inequities exist. Such is the goal of the following hypothesis.

H₇: Male executives earn more money than female executives

As suggested by the literature, education and certification tend to play a role in salary determination of employees. Education is measured as the number of years of schooling. Certification is measured in a dichotomous variable and is used in the analysis of means methodology that will be discussed later. In this case, the type of certificate would not be captured. Following are the two hypotheses dealing with education and certification.

H₈: Higher education translates into higher salaries

H₉: Executives with certification make more money than executives without certification

Competitive Practices and Cost of Living

Procurement officials were asked to state their county and state at the beginning of the data collection instrument. County and state information was used to link the data collected from respondents to census data on median household income and median housing value. Median housing value was used to measure cost of living in the counties where respondents work. Median household income was used as a measure of competitiveness in the job markets in counties where respondents work.

H₁₀: Higher median housing value in an area translates into higher salaries.

H₁₁: Higher median income in an area translates into higher salaries.

POPULATION, SAMPLE AND DESCRIPTIVE DATA

The instrument used to gather data for this study is an electronic survey that consists of thirty-six questions. A link to the survey was sent in November 2002 to all members of the National Institute for Government Procurement (NIGP). NIGP is the major professional association for public procurement officials. It was established in 1944 to provide education, professional certification, and technical assistance for public organizations. This e-mail was sent to all individuals who work in member organizations, and whose e-mail address was available to NIGP. About 6,747 members received this e-mail and a total of 1,673 individuals responded to the survey resulting in a response rate of over 26%. Of those, 448 responses were from heads of procurement units, 414 responses were from purchasing supervisors or materials managers, and the rest of the responses were from different members of purchasing agencies. In this article, only two sub-populations are being studied: heads of procurement units and purchasing supervisors/materials managers.

The dependent variable is the self-reported salary plus the bonuses as of September 2002. The average 2002 salary including bonuses for heads of procurement units is \$67,378 while that of supervisors and materials managers is \$55,201. On average, procurement heads had 17 subordinates while supervisors and materials managers had 10

subordinates on average. Procurement heads had an average of 18 years of experience in purchasing while supervisors had an average of 17 years of experience in purchasing. Table 1 highlights data for all independent variables and the dependent variable.

TABLE 1
Descriptive Statistics

	Valid Cases	Missing Cases	Mean	Median	Standard Deviation
Heads of Purchasing Units					
2002 Salary Including Bonuses	287	87	\$67,378	\$66,008	\$18,647
Annual Procurement Volume	334	40	\$295,618,642	\$30,000,000	\$2,776,222,421
Number of Subordinates	365	9	17	6	55.28
Hierarchy	347	27	1.44	1	0.85
Years of Experience in Purchasing	368	6	18.14	18	8.17
Years of Experience with Current Employer	368	6	11.62	11	8.40
Age	369	5	48.90	49	7.74
Number of Years of Education	348	26	15.93	16	2.06
Median Household Income	374	0	\$43,993	\$41,691	\$10,167
Median Housing Value	374	0	\$132,045	\$116,600	\$91,976
Supervisors/Materials Managers					
2002 Salary Including Bonuses	258	78	\$55,201	\$53,584	\$15,124
Annual Procurement Volume	274	62	\$3,808,216,607	\$31,500,000	\$60,404,580,214
Number of Subordinates	326	10	7.91	5	11.33
Hierarchy	312	24	1.84	2	1.00
Years of Experience in Purchasing	332	4	16.68	16	8.88

TABLE 1 (Continued)

	Valid Cases	Missing Cases	Mean	Median	Standard Deviation
Years of Experience with Current Employer	333	3	11.92	10	8.76
Age	331	5	47.54	48	8.20
Number of Years of Education	318	18	15.23	16	2.15
Median Household Income	336	0	\$43,246	\$41,691	\$9,597
Median Housing Value	336	0	\$142,027	\$116,250	\$133,018

RESULTS

Two data analysis tools were employed. First, multiple linear regression was used to test the effect of nine independent variables on the one dependent variable – salary plus bonuses for 2002. Second, analysis of variance (ANOVA) was used to detect any significant variance between males and females and between certified and non-certified employees. These models were tested for two datasets: heads of purchasing units and purchasing and/or materials managers or supervisors.

Multiple Regression Models

A series of models was developed to test each of the study propositions. The first multivariate regression model included ten independent variables and the 2002 salary including bonuses as a dependent variable. However, it was immediately obvious that age and number of years in the workforce were highly correlated (correlation > .89) causing problems of collinearity. Therefore, the most straightforward, parsimonious solution – dropping number of years in the workforce - was chosen for presentation. The final multivariate regression model included nine independent variables, annual procurement volume, number of subordinates, number of years of purchasing experience, years with current employer, number of levels between head of purchasing units and the head of the agency, education, age, median housing value, and median household income, and the 2002

salary including bonuses as a dependent variable. All assumptions of linear regression were met.

As shown in Table 2, for purchasing unit heads, the level of determination of the model is 0.399. Annual procurement volume is statistically significant at the 0.014 level and has a beta value of 0.142. The number of subordinates is statistically significant at the < 0.0005 level and has a beta value of 0.282. Number of levels of hierarchy is significant at the 0.081 level and has a beta of -0.087. The variable “total years of purchasing experience” is statistically significant at the 0.019 level and has a beta value of 0.134. The variable “total years with current employer” is statistically significant at the 0.002 level and has a beta value of 0.161. Age is not statistically significant. Number of years of education is statistically significant at the < 0.0005 level and has a beta value of 0.248. Median household income is statistically significant at the <0.0005 level and has a beta value of 0.212. Median housing value is

TABLE 2
Results of Multiple Regression

	Heads of Purchasing Units R² : 0.399 Adjusted R² : 0.378		Purchasing Supervisors/ Materials Managers R² : 0.403 Adjusted R² : 0.377	
	Beta	Significance	Beta	Significance
Annual Procurement Volume	0.142	0.014	0.146	0.007
Number of Subordinates	0.282	0.000	0.226	0.000
Hierarchy	-0.087	0.081	-0.059	0.291
Years of Experience in Purchasing	0.134	0.019	0.153	0.021
Years of Experience with Current Employer	0.161	0.002	0.174	0.004
Age	0.037	0.527	0.046	0.478
Number of Years of Education	0.248	0.000	0.272	0.000
Median Household Income	0.212	0.000	0.260	0.000
Median Housing Value	0.168	0.002	0.230	0.000

statistically significant at the 0.002 level and has a beta value of 0.168. All assumptions of linear regression were met.

For purchasing supervisors and materials managers, the level of determination of the model is 0.403. Annual procurement volume is statistically significant at the 0.007 level and has a beta value of 0.146. The number of subordinates is statistically significant at the < 0.0005 level and has a beta value of 0.226. Number of levels of hierarchy is not statistically significant. The variable 'total years of experience in purchasing' is statistically significant at the 0.021 level and has a beta value of 0.153. The variable 'total years with current employer' is statistically significant at the 0.004 level and has a beta value of 0.174. Age is not statistically significant. Number of years of education is statistically significant at the < 0.0005 level and has a beta value of 0.272. Median household income is statistically significant at the < 0.0005 level and has a beta value of 0.260. Median housing value is statistically significant at the 0.002 level and has a beta value of 0.230. The results are also displayed in Table 2.

Analysis of Variance Models

ANOVA was used to test the significance of variance of means according to gender and certification. Two models, one with gender as a factor and another with certification as a factor, were run using the two datasets.

The variance of means test reflects a statistically significant difference between males and females for both heads of purchasing units and purchasing/materials supervisors. On average, male heads of purchasing units make \$70,741 (186 respondents) and female heads of purchasing units make \$61,164 (100 respondents). This \$9,577 difference in annual salary is significant at the 0.0005 and better level. On average, male supervisors and materials managers make \$58,994 (128 respondents) and female supervisors and materials managers make \$51,466 (130 respondents). This \$7,528 difference in annual salary is also significant at the 0.0005 and better level (Table 3).

The variance of means test reflects an insignificant difference between those who hold some certification and those who do not. This insignificance occurred with heads of purchasing units and with purchasing/materials supervisors.

DISCUSSION

A very important finding of this study is that compensations levels for males and females were substantially different (\$9,577 difference for heads of purchasing units and \$7,528 for supervisors and managers). This follows a national trend suggested in the literature review across the public sector (Alkadry et al., 2002; Bullard & Wright, 1993; Guy, 1993;

TABLE 3
Effect Sizes Sorted Highest to Lowest (effect sizes)

Heads of Purchasing Units	Purchasing Supervisors/Materials Managers
1. Number of Subordinates (0.282)	1. Number of Years of Education (0.272)
2. Number of Years of Education (0.248)	2. Median Household Income (0.26)
3. Median Household Income (0.212)	3. Median Housing Value (0.23)
4. Median Housing Value (0.168)	4. Number of Subordinates (0.226)
5. Years of Experience with Current Employer (0.161)	5. Years of Experience with Current Employer (0.174)
6. Annual Procurement Volume (0.142)	6. Years of Experience in Purchasing (0.153)
7. Years of Experience in Purchasing (0.134)	7. Annual Procurement Volume (0.146)

Naff, 1994). However, this finding also contradicts the findings of a study of the chief purchasing officers in Fortune 500 companies (Ogden et al., 2002).

Further analysis of means differences between men's and women's mean age, mean education, mean number of subordinates and mean number of years of experience revealed no fundamental differences. As discussed in the literature review, pay difference in this case cannot hide behind the traditional organizational, human capital, or social and cultural barriers. Neither can pay inequity use excuses of experience, tenure, age, and supervisory responsibilities.

Consistent with the findings of Morgan (1997) and Fitzgerald (1998), spending had a significant effect in predicting the compensation of purchasing managers and executive. However, annual procurement volume had a relatively lower effect than that of other independent variables.

Supervisory responsibilities had the highest effect size (0.282) on the compensation of heads of purchasing units. However, it had the fourth-largest effect size (0.226) on the compensation of supervisors and materials managers. The effect of supervisory responsibilities on compensation is consistent with the Ogden et al. (2002) and the Langer (2000) findings.

The number of levels of hierarchy between the head of the purchasing unit and the head of the agency has no significant effect on the compensation. The size of levels of hierarchy was also insignificant for purchasing supervisors and materials managers. This is inconsistent with Ogden et al. (2002) finding for chief purchasing officers of the Fortune 500 firms.

Ogden et al. (2002) found no effect of the years of purchasing experience on purchasing heads' compensation levels. The study undertaken in this article outlined three types of experiences that could affect one's compensation: non-purchasing experience, purchasing experience and the number of years with current employer. Non-purchasing experience caused collinearity problems with age. Therefore, it was removed from the model. The other two types of experiences were tested in the multiple regression model. Years with current employer had the fifth-largest effect (0.161) on compensation of heads of purchasing units and also the fifth-largest effect (0.146) on compensation of purchasing supervisors and materials managers. Years of experience in purchasing had the seventh-largest effect (0.161) on compensation of heads of purchasing units and the sixth-largest effect (0.146) on compensation of purchasing supervisors and materials managers.

Previous studies on the effect of age on compensation concluded that age has some effect (Morgan, 1997; Ogden et al., 2002). Most of these studies use categorical variables. In this study, the age variable is an interval variable. Age was statistically non-significant in the regression model for all studied occupations, a result which is inconsistent with previous findings of studies reviewed in this article.

Morgan (1997) found that purchasing staff with graduate degrees earned more than those with undergraduate degrees. Ogden et al.'s (2002) findings did not support this kind of relationship. In the regression models tested in this study, education had the largest effect on compensation of supervisors and materials managers, while it had the second-largest effect on compensation of heads of purchasing units.

The analysis of variance model shows that there is no significant effect of certification on the compensation of heads of purchasing units or on the compensation of purchasing supervisors and materials managers. This is consistent with the findings of Ogden et al. (2002).

Cost of living and labor market competitiveness had substantial effects on the compensation of heads of purchasing units, purchasing supervisors and materials managers. Median housing value, which is a measure of cost of living, had the fourth-largest effect size (0.168) on the compensation of heads of purchasing units, and the third-largest effect size (0.23) on the compensation of purchasing supervisors and materials managers. Median household income, which is a measure of labor market competitiveness, had the third-largest effect size (0.212) on the compensation of heads of purchasing units, and the second-largest effect size (0.26) on the compensation of purchasing supervisors and materials managers (Table 4).

Some factors had no effect on compensation levels of heads of procurement units and materials managers and procurement supervisors. These include certification, age, and the number of levels between respondents' positions and the chief executive officers in their agencies.

The relatively low levels of determination (r^2) values for both models are indications of under-specification of the two regression models. Despite the fact that 10 independent variables were included in the initial models, the level of determination of the model was 0.399 for the heads of purchasing units and 0.403 for procurement supervisors and materials managers. This means that about 40% of the variance in compensation levels was accounted for by variance in the ten independent variables: budget size, supervisory responsibilities, experience, authority level, education, age, cost of living and labor market competition on the compensation of purchasing supervisors and heads of purchasing units. Age is another variable which was certainly very relevant, but the extent to which it affects variance in the dependent variable is harder to measure in ANOVA than in multiple linear regression procedures. The

mean income of males is higher than that of women by \$7,500 for supervisors and \$10,000 for heads of purchasing units. That difference indicates a very high effect of gender on compensation.

TABLE 4
Decision Table

Hypothesis	Decision for Heads of Purchasing Units	Decision for Purchasing Supervisors & Materials Managers
H ₁ : As annual procurement volume increases, the compensation of the head of the purchasing unit increases.	Reject H ₀	Reject H ₀
H ₂ : As the number of subordinates increases, the compensation of a purchasing unit head also increases.	Reject H ₀	Reject H ₀
H ₃ : As the number of levels between the head of the purchasing unit and the agency head decreases, the salary of the head of the purchasing unit increases.	Fail to Reject H ₀	Fail to Reject H ₀
H ₄ : As the number of years of experience in purchasing increases, the salary of purchasing unit head increases.	Reject H ₀	Reject H ₀
H ₅ : As the number of years of experience with the current employer increases, the salary of purchasing unit heads increases.	Reject H ₀	Reject H ₀
H ₆ : Older executives earn more money	Fail to Reject H ₀	Fail to Reject H ₀
H ₇ : Male executives earn more money than female executives	Reject H ₀	Reject H ₀
H ₈ : Higher education translates into higher salaries	Reject H ₀	Reject H ₀
H ₉ : Executives with certification earn more money than executives without certification	Fail to Reject H ₀	Fail to Reject H ₀
H ₁₀ : Higher Median Housing Value in an area translates into higher salaries.	Reject H ₀	Reject H ₀
H ₁₁ : Higher Median Income in an area translates into higher salaries.	Reject H ₀	Reject H ₀

CONCLUSION

The study is limited to employees of member organizations of the National Institute of Government Procurement (NIGP). While there are no obvious reasons why this sample would have any coverage bias, it is still a matter of concern. However, a list of all procurement units in the United States was not available and the NIGP membership list was the closest thing to such a comprehensive list.

This article investigated the impact of several factors on the compensation levels of heads of procurement units on one hand, and materials managers and procurement supervisors on the other hand. The results were not much indifferent for the two groups of positions. Indeed, of the eleven independent variables used, certification, age, and the number of levels between respondents' positions and the chief executive officers in their agencies were insignificant for both positions. These results were consistently different from the literature that was surveyed in this article. This is but an indication that applies to procurement managers and executives in the private sector and does not necessarily apply to procurement managers and executives in the private sector.

Finally, this article has addressed the effects on compensation of executives, managers, and supervisors of public procurement units. It compared these effects to effects discovered for similar positions in private purchasing units, or to executives in other industries in the private sector. The findings revealed that public procurement compensation effects are not similar to the reviewed literature. In future studies, it is important to explore whether this difference is consistent across different positions in public procurement units.

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