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**CRITICAL FACTORS FOR SUPPLIERS'ASSESSMENT AND SELECTION:
EMPIRICAL EVIDENCE FROM PUBLIC INSTITUTIONS IN A DEVELOPING
COUNTRY**

Abstract

This examined the critical factors that influence the selection of suppliers in public institutions in Ghana. The study employed both descriptive and survey research design. The study was conducted between April, 2015 and March, 2017. Public institutions in the Brong Ahafo and Ashanti regions of Ghana constituted the population of the study. The study made use of purposive sampling technique to select 100 public institutions. Self-administered questionnaire was used to collect data from the respondents. Descriptive statistical analysis method was used to analyze the quantitative data. The analyses was done in percentages and mean and presented in relevant tables. The study found that the traditional suppliers' performance measurement approach, based on lowest cost was widely used to measure the performance of suppliers in public institutions in Ghana. Additionally, majority of the institutions applied categorical system and analytical hierarchical process of performance assessment alongside the cost based system. With regards to the specific criteria applied to assess the performance of suppliers, it was revealed that the quality or technical capabilities (e.g. durability, reliability, fitness for purpose and less variance of the products) of the suppliers was a major factor considered. Apart from quality criteria, cost criteria (price level, price stability and discounts and terms of payments offered by the suppliers) and delivery ability of the suppliers were also used to assess the performance of suppliers. It is recommended that the management of the institutions should provide modern performance management tools to enable effective assessment of suppliers' performance.

25

26 **Key Words:** Public Procurement, Suppliers' Performance, Cost Criteria, Quality Criteria,
27 Delivery Criteria, Public Institutions

28

29 1.0 INTRODUCTION

30 The need to increase the effectiveness, efficiency and transparency of Ghana's public
31 procurement system, is of concern to the Government of Ghana (GoG). According to [1],
32 public procurement can be susceptible to abuse, which can lead to leakage of public funds
33 during the procurement process, and investments that are of substandard quality and often
34 lacking the proper quantity. [1] indicated that procurement activities in the public sector
35 represents for a substantial percentage of the total request for supplies and is progressively
36 observed as an alternative and viable tool for advancing the aims of novelty strategies.

37 In light of the increasing complexity of the procurement system, the participation of
38 suppliers, consultants and contractors has become influential in the pursuit for attaining
39 sustainability compliance along the procurement system. [2] explained that procurement
40 improves productivity and competitiveness, among other benefits. However, the authors
41 argued that to realise the gains stated above, it is necessary to choose and keep suppliers who
42 are able and capable. Nonetheless, a lot of issues influences the ability of an organization to
43 select the appropriate supplier. In this regard, [3] assert that there is a need to assess the
44 performance of the suppliers to help set appropriate supplier selection criteria. The authors
45 proceeded that, commitment, trust, adequate finance, reliable delivery times, communication,
46 technology, and cost or price have been noted as the commonly used criteria.

47 [4] noted that a vital concern in procurement administration is the assessment of suppliers'
48 performance. [5] defined performance assessment as assessing, evaluating and managing the

49 supplier's ability to fulfill and if possible surpass, their promised commitments. Likewise,
50 according to [6] and dealing with supplier's performance with the aim of decreasing costs,
51 alleviating risk, and driving constant enhancements in value and operations.

52 [3] explained that collective and constant measurement can assist organizations and
53 institutions focus resources, identify performance glitches, develop strategies for supply chain
54 improvements, and determine the total cost of ownership of supply relationships, products,
55 and entire supply chains. Similarly, [1] contend that monitoring the performance of suppliers
56 is a crucial phase of procurement management, however, one which can simply be under-
57 resourced and neglected. [2] also posit that when performance monitoring is undertaken post-
58 contract, the purpose is two-fold: to make sure that the supplier meets the performance
59 criteria and ascertain room for improvement.

60 An essential concern in evaluating the performance of suppliers is determining who is best
61 suited to evaluate that performance [7]. The authors maintain that the performance of
62 suppliers must be evaluated impartially against standards that are determined in advance,
63 understood plainly and settled by both parties. [1] are also of the opinion that sound
64 performance assessment techniques must be applied. The authors explained that issues such
65 as: conflict amongst criteria; multiple criteria (both quantitative and qualitative); involvement
66 of many alternatives because of competition; internal and external limits forced on
67 purchasing process makes supplier selection decision process very complicated. Nonetheless,
68 [3] contend that it takes a great deal of energy and tolerance to develop an agreed criteria for
69 suppliers' performance measurement. Whilst it is important to assess the performance of
70 suppliers among suppliers in public institutions, the criteria to use to measure the suppliers
71 performance is the most important thing. The use of wrong methods and criteria will result to
72 wrong evaluation. It is therefore important to ascertain the various methods and criteria that

73 are employed to select and measure the performance of suppliers in the public sector. Sadly,
74 literature on performance measurement of suppliers in the public sector in Ghana is non-
75 existing. This study thus aims to fill the yawning gap by providing evidence on the critical
76 factors that influence the selection of suppliers in the public sector in Ghana. Specifically, the
77 study evaluates the various methods and criteria employed to measure the performance of
78 public sector institutions in Ghana.

79

80 **2.0 LITERATURE REVIEW**

81 **2.1 The concept of Public Procurement**

82 The public procurement activities has mirrored pressures between public anticipations of
83 great standards of governance, overt (and covert) political impact and forces from wider
84 interest of stakeholders. Similarly, [1] opined that public procurement practices at one end are
85 extremely narrow and controlled structures, while some are characterized by utmost complete
86 deregulation and decentralized duties where procurement is just another element of
87 mainstream management. Public procurement is defined by [4] as the process by which
88 institutions and organizations buy goods and services from other organizations, usually
89 companies or enterprises. The authors assert that procurement occurs at both national and
90 regional level and usually the procurement process is subjugated to specific rules and policies
91 involving how the pertinent decisions are taken. Similarly, [3] argue that procurement is the
92 process of obtaining goods and services in any way, like leasing, borrowing and even force or
93 booty.

94 [8] contend that the effectiveness of procurement in Ghana is a major function of any
95 organization. The authors maintained that the capacity and scope of procurement differ from
96 institution to institution, nonetheless, the philosophies, principles and processes are
97 essentially similar. In view of this, [1] opines that the different definition and concepts given

98 by diverse individuals and organizations about procurement reveal fairly dissimilar
99 observations of what public procurement is for various organizations and stakeholders. This
100 also submits that reconciliation between these opposing forces is not simply difficult but
101 unsure because it represents more than conflicting expectations about what procurement is all
102 about.

103 From the above, an attempt must therefore be made to define or at least attempt to explain the
104 word procurement in public context. [4] defined public procurement as the process by which
105 government departments or agencies purchase goods and services from the private sector.
106 The authors maintained that it takes place at both national and regional levels. [1] also defined
107 procurement as the process of obtaining goods and services in any way, including borrowing,
108 leasing and even force or pillage. From the layman point of view, procuring can be seen as
109 the act of acquiring or obtaining something; hence it is a general activity of mankind. From
110 the definitions provided above, procurement can be defined simply as the procedure through
111 works, goods, services and consultancies are acquired by putting in the essential energy. In
112 relation to public procurement, procurement involves the course of purchasing supplies or
113 equipment for a government unit or agency or a corporation or the process of earning
114 something particularly with effort or difficulty. It is clear from the above discussion that
115 public procurement plays an important role in the acquisition and distribution of goods,
116 works, and services to end user institutions, organization, groups, and individuals. This
117 process is however noted to be the life wire of every institution, either public or private.

118

119 **2.2 The Concept of Supplier Performance Management**

120 Supplier management is defined by [9] as the part of procurement concerned with str
121 eamlining the supplier base and selecting, coordinating, appraising the of suppliers and
122 building long term collaborative relationships. As demonstrated in the above definition,

123 monitoring and measuring supplier performance is just one of the many activities involved in
124 supplier performance management. Endorsement this point of view, [10] however regard
125 evaluation, measurement and analysis of suppliers' performance as an important part of
126 supplier performance management. [11] assert that the main aim of the supplier performance
127 assessment is to lessen the risk related to purchase and maximize the overall value of the
128 purchaser. Supplier performance assessment usually involves assessing, at a minimum, suppli
129 er quality, cost competitiveness, potential delivery performance and technological capability.
130 [1] also explained that some of the other criteria used in the introductory appraisal of suppli
131 ers include financial risk analysis, evaluation of previous performance, and evaluation of
132 supplier provided information.

133 According to [7], the supplier performance measurement is an important process. The suppli
134 er performance measurement is a continuous process which is distinct from the supplier
135 evaluation and selection. The author further argued that effective methods and systems are
136 required in order to record, evaluate and develop supplier performance. In relation to this, [6]
137 contents that determining on what to measure and how to weigh each measurement criterion
138 is a critical part in designing supplier measurement system. The authors further opine that th
139 ere are two approaches to supplier evaluation: quantitative and qualitative. [4] also provide
140 that price, quality and delivery are the traditional quantitative variables. [6] observed that d
141 elivery, quality and cost reduction are the main categories for quantitative variables.

142

143 **2.3 Supplier Measurement Techniques and Assessment Methods**

144 According to [9], a supplier selection is a multi-objective problem concerning quantitative
145 and qualitative criteria. [6] assert that three suppliers measurement methods exists: weighted-
146 pointed system, categorical system and cost-based system. Apart from the three methods
147 identified by [6], two additional methods were also put forward by [12], which includes,

148 analytic hierarchical process (AHP) and mathematical programming model or artificial neural
149 network (ANN).

150 **Weighted-Pointed Method of Linear Average Method:** According to [13], weighted-
151 pointed method is a method that evaluates and calculates scores in all criteria. Weighted
152 average method is more dependable and permits reliable ranking of suppliers. Additionally,
153 [9] argues that quantitative and qualitative criteria can be put together in this system. The
154 authors further indicated that to use the system, the key performance indicators for supplier
155 performance assessment must be cautiously chosen. In addition, individuals involved in this
156 process have to decide on the weight of each performance category. The firm decides a w
157 eight allocating to prevent or minimize subjectivity. The weight for the individual performanc
158 e group is then multiplied by the performance score that is allocated to it. Finally, these
159 scores are aggregated to ascertain a final rating for each supplier.

160 **Categorical System:** [13] identified the categorical system as the most subjective and, thus,
161 the least reliable. Additionally, the categorical system is a low-cost system and easier to
162 implement. Because of the above attributes of the categorical system, it is widely used by
163 small firms and the firms which are in the process of developing an evaluation system. As has
164 been identified, the categorical supplier measurement method is the easiest method to use,
165 however, [4] noted that it suffers from subjectivity. This is because it fails to provide compr
166 ehensive insight into the suppliers' true performance because the attributes being measured ar
167 e weighted equally.

168 **Cost-Based Method:** The cost-based method is argued to be the most advanced and least
169 subjective [13]. The cost-base method is applied by calculating the additional cost (the costs
170 for each non-performance) every time supplier does not perform as expected. This is however
171 argued to be the main challenge associated with the use of the cost-based system. Likewise,

172 [12] opines that the cost-based method is a methodology, which looks further than price to
173 embrace several other purchase-related costs.

174 The cost-based method is very objective because it calculate the total cost of doing business
175 by considering non-performance costs [6]. According to the authors, the main difficulty
176 associated with the used of the cost-based method are its complexity and its requirement that
177 users have a developed cost accounting system. , [4] also observed that even though this
178 sounds like an ideal way of handling cost, it is difficult to detect the costs of suppliers' non-p
179 erformance.

180 **Analytical Hierarchical Process (AHP):** According to [13], the analytical hierarchical
181 process (AHP) is a decision-making method established for prioritizing alternatives when
182 multiple criteria must be considered and permits the decision maker to structure complex
183 problems in the form of a hierarchy, or a set of integrated levels. [14] employed the analytical
184 hierarch process (AHP) approach for critical factors for effective supplier selection.

185 **Mathematics Programming Models or Artificial Neural Network (ANN):** [15] argued
186 that the mathematics programming model or artificial neural network is often considered as,
187 more quantitative criteria. According to [12], the ANN model is economical and saves time.
188 The deficiency of this model is that it requires specific software and demands competent p
189 ersonnel who are expert on this subject.

190

191 **2.4Critical Factors Affecting the Selection of Suppliers**

192 [3] explained that the selection of a supplier is normally a time wasting procedure that assess
193 suppliers on numerous standards or criteria. These criteria includes the production cost, cost
194 of raw materials, quality assessment, quality staff, delivery system, personal facilities etc.
195 [11] has showed that fundamental to the established selection criteria of suppliers is the nec

196 essy to evaluate the quality and service abilities of a supplier together with plans and manag
197 erial orientation with the purchaser. The authors further opine that the selection of suppliers is
198 a complex process because several criteria must be taken into consideration during the proc
199 ess of decision making.

200 As a recommendation, [7] opine that a data/information bank having the list of approved
201 suppliers, with their profiles in crucial in the supplier selection process. According to the
202 authors, essential information have to include technical capability, quality assessment and
203 organization profile. A supplier selection criterion was introduced by [3] which has since
204 gained a lot of fame. [12] model consists of: cost criteria, technical capability criteria, quality
205 criteria, organizational profile criteria, service criteria, supplier profile criteria and response
206 to customers:

207 **Cost Criteria:** [3] assert that the primary objective of the cost benchmark is to identify
208 significant component of cost linked to purchase. The authors explained that the most popular
209 cost element connected to a product is purchase price, transportation cost and taxes.
210 Similarly, operational costs are also taken into consideration during the process of selecting a
211 supplier. The operational cost comprises of transaction processing; cost of rejects etc. but it r
212 equires more efforts to estimate.

213 **Technical Capability:** It has been argued that component technical ability is needed by
214 suppliers to offer quality product or service, guarantee future enhancement in performance
215 and stimulate fruitful development efforts. The technical capabilities of a supplier are
216 particularly very important when the strategy of a firm include the development of a new
217 product or technology or right to use to proprietary technology. [16] also observe that the t
218 echnical capabilities factor has been measured on the basis of the significance of the

219 following technical dimensions: compliance with quantity, compliance with packaging
220 standard, compliance with due date and plant layout and material.

221 **Quality Assessment:** According to [10], quality assessment is a crucial factor of suppliers by
222 which they can increase and maintain quality and delivery performance. [17] asserts that the
223 quality of a product or a service has been measured on the basis of the important of the
224 following quality dimensions: management commitment, process improvement of suppliers,
225 product development of suppliers, quality assessment in production, quality planning and
226 quality staff of suppliers. The quality of a product or a service is a very critical criteria b
227 ecause it affects the rejection rate of a product or a service.

228 **Organizational Profile:** [10] opine that the profile of an institution are evaluated on the basis
229 of the significance of the following measurements: financial performance, attainment of sales
230 and marketing goals, accomplishment of current organizational goals and strategy for
231 technology age. It is therefore imperative to note that good suppliers have to have high
232 organizational power and advanced coordination skills.

233 **Service Delivery Levels:** The suppliers' performance in the provision of service to its clients
234 is the leading criteria used to decide its appropriateness for a specific product [6]. According
235 to the author, the service level of the supplier is analysed based on delivery and lead time. Th
236 e delivery factors means the capacity of the supplier to observe the determined supply tim
237 etable is always the main criterion for the selection of a supplier in this fast moving world
238 [17]. This suggests that suppliers who are able to keep their promises are easier and profitable
239 to work with. The time is the time between order and delivery of material and the actual deliv
240 ery.

241 **Supplier's Profile:** The profile of a supplier consists of their performance and past history.
242 The performance and past history of the suppliers assist to take decisions regarding the

243 selection of a supplier. [17] provides that the components of a suppliers profile consists of the
244 financial status and responses of customers. According to [18], the financial status of the
245 supplier can be evaluated by gathering the information about the annual turnover of suppliers
246 and their financial structure based on the past history. The economic status of the suppliers'
247 country has to be ascertained which includes: the effect of the currency exchange rate, local
248 price control etc.

249 **Response of Customers:** One of the significant criteria used to assess the performance of
250 suppliers is the reaction or response of the customers towards the supplier. [10] posit that
251 suppliers that have a good customer base should be favoured more than others. Similarly, the
252 authors argued that the performance history of the supplier must be evaluated prudently by
253 noting the competitive nature of the supplier, response to market, its past production schedul
254 e, and its ability to make commercial relations and business references. [4]thus contends that
255 old supplies are more experienced and more stable in business.

256 The literature provides information on the concept of public procurement, particularly in
257 Ghana. In addition, the concept of supplier performance management has also been reviewed
258 in addition to the various techniques and methods used to measure and assess the
259 performancve of suppliers. The literature review has also provided the various critical factors
260 that affect the selection of suppliers. What is clear from the literature is that these techniques,
261 methods and critical factors were exclusively related to the private sector. Similarly, the
262 various empirical studies were exclusively undertaking in developed countries. However,
263 similar studies in developing countries, particularly in public institutions in Ghana are
264 unavailable, thus necessitation this study.

265

266 3.0 METHODOLOGY

267 The study employs a survey study approach. Survey is employed in most studies which aims
268 directly at generalized understanding instead of a comprehensive understanding of a single,
269 individual case [19]. [19] further argues that survey study is regularly used to assess
270 practices, thoughts, opinions, and feelings. Many studies have highlighted the benefits of a
271 survey method. First, [6] argues that surveys are an exceptional way to gather many data
272 from wide variety of people. This makes surveys comparatively cost effective. Connected to
273 the advantage of cost effectiveness of survey, is that survey has the prospects of
274 generalizability. Descriptive research approach is also used to structure this study. [20]
275 explain that descriptive research studies are designed to ascertain information, which relates
276 to the current status of development. The descriptive research approach was chosen because
277 variables are not manipulated by the researcher, instead, the study describes the phenomenon
278 that existed at the time of the research.

279 Public institutions in the Brong Ahafo and Ashanti regions of Ghana constituted the
280 population of the study. The various institutions considered for the study included: public
281 tertiary institutions, hospitals, government assisted senior high schools, colleges of
282 educations, municipal and district assemblies, nursing training colleges, ministries,
283 department and agencies. The procurement departments/units or accounts departments of one
284 hundred (100) public institutions were chosen for the study. Two respondents were selected
285 from each institution. As a result, a total of two hundred (200) respondents were chosen for
286 the study. The study made use of purposive sampling technique to select the respondents.
287 This is because, the procurement departments or where necessary, the accounts department
288 dealt directly with the suppliers and thus they were assumed to be better placed to assess the
289 performance of the suppliers. The respondents that were purposively selected were the head
290 and staff of the procurement units of the public institutions.

291 Self-administered questionnaires were used to collect data from the respondents. Both closed-
292 ended questions and open-ended questions were used to design the questionnaire. The
293 questionnaires were mainly made up of Likert-scale questions. In this study, only five
294 categories were used, for example: Strongly Agree (SA), Agree (A), Neutral (N), Disagree
295 (D), and Strongly Disagree (SD). Certain principles were observed during the design of the
296 questionnaires. The questions were concise, short, simple, straight forward and clear. Two
297 hundred (200) questionnaires were distributed to the respondents at their various offices. The
298 researchers allowed a period of two weeks to collect the questionnaires from the respondents.

299 Descriptive statistical analysis method was used to analyze the quantitative data. The various
300 answers provided in the Likert scale questions were assigned numbers and were analyzed.
301 The analyses was done in percentages and were also reduced to mean or average values. Data
302 obtained were organized in relevant tables with the help of computer data analyses software
303 such as the use of Statistical Package for Social Sciences (SPSS), version 21.

304

305 **4.0 RESULTS AND DISCUSSION**

306 **4.1 Methods used to measure Suppliers Performance**

307 This section presents the data on the methods used to measure the performance of suppliers in
308 public institutions in Ghana. The data obtained on this subject matter is presented in Table
309 1. As shown in Table 1, almost all the respondents (93.5%) measured the performance of
310 suppliers using the cost based method. The main idea of the cost-base method is to calculate
311 the total cost of procuring goods or services from a supplier. The respondents indicated that
312 the cost-based method is implemented by calculating the price of goods and services of the
313 various suppliers. The movement and variation in the prices of the goods and services are
314 also determined. Similarly, the cost based method is applied by calculating the additional
315 costs (the costs for each non-performance) every time supplier does not perform as expected.

316 It was further ascertained that the cost-based method assesses the performance of supplier by
317 using the tools of standard cost analysis. This implies that these institutions must institute a
318 good system of costing and accurate records of each supplier to enable this method to be
319 applied effectively. However, it was realized that good system of costing and accurate
320 records on suppliers were not kept thus posing as a major challenge to the effective
321 application of the cost based method. Nonetheless, it was realized that this is the widely used
322 method to assess the performance of suppliers in public institutions in Ghana. The result of
323 this study is consistent with the findings of [4] who found that the cost-based method is the
324 most widely used method of assessing the performance of suppliers.

325 Table 1 further shows that 149 (74.5%) of the respondents also applied categorical system of
326 performance assessment alongside the cost based system. It was realized that the categorical
327 method is applied by categorizing the performance of each supplier in specific areas
328 identified by a list of applicable performance assessment variables. This method involves a
329 process where the institutions maintains records of all suppliers and monitored, along with
330 their actual performance by product. With this method, the institutions developed records of
331 important performance factors for assessment purposes, and the institutions assigns a grade in
332 simple categorical terms, such as very good, good, neutral and unsatisfactory, indicating the
333 vendor's actual performance in each area.

334 From the study, it was ascertained that this method is one of the easiest in comparison to the
335 other performance assessment methods. Furthermore, it was observed that the categorical
336 system is a low-cost system and its implementation is easy. The findings corroborates the
337 findings of [4] who observed that the categorical system, it is widely used by firms,
338 especially the firms which are in the process of developing an evaluation system. As easy as
339 it may appear, this method however might fail to effectively assess a supplier's performance

340 because it fails to provide a comprehensive understanding into the true performance of
341 supplier since the attributes assessed are weighted equally.

342 The result presented in Table 1 further shows that Analytical Hierarchical Process (AHP) was
343 the next widely used method apart from the cost based and the categorical methods. As
344 indicated in Table 1, almost half (48.5%) of the respondents also used Analytical Hierarchical
345 Process to assess the performance of suppliers in public institutions in Ghana. The study
346 found that the Analytical Hierarchical Process (AHP) is a decision-making technique put in
347 place to prioritize alternatives when multiple criteria must be considered and allows the
348 institutions to structure complex problems in the form of a hierarchy, or a set of integrated
349 levels. This result is not at variance with similar studies like [14] who used the Analytical
350 Hierarch Process (AHP) method for supplier selection and observed that supplier reliability,
351 product quality and supplier experiences are the critical factors for effective supplier
352 selection.

353 The study further revealed that 82 (41.5%) of the respondents used the Weighted-Point
354 Method to measure the performance of suppliers in their institutions. The respondents that
355 applied the weighted average method to assess the performance of suppliers indicated that the
356 weighted pointed method adds the qualitative elements of the categorical system and
357 quantifiable procedures of the cost-based system. From the respondents' perspective, many
358 evaluation factors are identified and weights are then assigned to each factor. The relative
359 importance of each factor are then expressed in numerical terms (weights) in such a way that
360 a Hcomposite performance index can be calculated and supplier comparisons made.

361 The respondents further indicated that their institutions normally use the weighted point
362 system because it is reliable and it has a lower cost of implementation. The respondents
363 further indicated that the weighted point method was also flexible because they could alter

the weights assigned to each performance category or vary the performance categories themselves depending on the strategic priorities of the organizations. It can be revealed that this method is not particularly popular among the respondents. This can be attributed to its long process and complex nature. Additionally, it can be observed that the weighted point method is subjective because the categories and weights can be assigned arbitrarily based on one's intuition, experience and opinion. It therefore would make comparison across institutions difficult. Nonetheless, if it is applied effectively, it can be one of the best methods because of its quantitative and qualitative appeals.

Finally, none of the respondents (or institutions) applied the Mathematical Programming Model to measure the performance of suppliers in their institutions. Some of the respondents indicated that they were aware of this method, however it requires a complex process which requires analytical software and accurate data. The respondents further indicated that such software were not available and thus made its application not practicable. From the discussions above, it can be realized that majority of the respondents used more than one method to assess the performance of suppliers. Some of the methods were used as complementary whilst the performance of some of the suppliers were measured with specific methods because of the type of data obtained from them by the institutions. It must be put forward that the availability of data determines the type of method to be used to assess the performance of a supplier. Some data might be suitable for a particular method whilst the same data might not be suitable for alternative methods.

Table 1: Methods used to measure Suppliers Performance

Supplier Performance Measurement	Frequency	Percentage (%)
Weighted-Point Method	82	41.0

Categorical System	149	74.5
Cost-Based Method	187	93.5
Analytical Hierarchical Process (AHP)	96	48.0
Mathematical Programming Models	0	0.0

4.2 Criteria used to measure the performance of Suppliers

The various criteria employed by the public institutions to measure the performance of suppliers are presented in this section. These criteria have been analyzed alongside four main categories: cost, delivery, quality or technical capability and organizational profile.

4.2.1 Cost Criteria

As shown in Table 2, majority of the respondents (69.5%) strongly agreed that price level was a criteria used to measure the performance of suppliers whilst 19.5% agreed. With a mean value of 1.54, it clearly indicates that majority of the respondents used price level as a criteria to measure the performance of suppliers. In addition, 54.5% of the procurement staff strongly agreed that the stability of prices of goods and services from suppliers was used to measure the suppliers' performance whilst 27.5% agreed. On the other hand, only 11.5% of the respondents disagreed that price stability was a criteria used by the public institutions to measure the performance of suppliers. The mean rating of the respondents that indicated that the stability of price of goods from suppliers was used to measure the suppliers performance was 1.25, thus depicting that majority of the staff used the stability of price of goods from suppliers to measure the suppliers' performance.

The respondents were further asked to indicate whether they used the advance notice of price changes from suppliers to measure the performance of suppliers. As shown in Table 2, slightly more than one-third (36.0%) of the respondents agreed that they used advance notice from suppliers regarding price changes to measure the performance of suppliers. On the other

406 hand, 27.5% of the respondents strongly agreed that advance notice from suppliers on price
407 changes was one of the criteria used to measure the performance of suppliers whilst 23.5%
408 disagreed and additional 4.0% strongly disagreed. A mean rating of 0.58 was ascertained for
409 the respondents that indicated that they used advance notice from suppliers regarding price
410 changes to measure the performance of suppliers. This clearly shows that majority of the
411 respondents used the advance notice from suppliers regarding price changes to measure the
412 performance of suppliers.

413 An additional 62.0% of the respondents strongly agreed that discount and payment terms
414 offered by suppliers was used to assess their performance. Another 27.5% also agreed that
415 discount and payment terms offered by suppliers was used to assess their performance. The
416 mean rating of respondents that agreed that the discount and payment terms offered by
417 suppliers was used to assess their performance was 1.45. This indicates that the respondents
418 used the discount and payment terms offered by suppliers was used to assess their
419 performance.

420 The discussion above indicate that the staff at the procurement units of the public institutions
421 in Ghana used various cost criteria to assess the performance of suppliers. The result shows
422 that price was the criteria mostly used to measure the performance of suppliers followed by
423 the stability of the prices of goods. The discounts and terms of payments offered by suppliers
424 was another criteria mostly used to measure suppliers' performance and then advance notice
425 of price changes followed. This finding confirms that of [3], [9] and [18] who reported that
426 pricing or cost criteria was one of the major criteria used to measure the performance of
427 suppliers. According to the author, the pricing criteria means that the prices should be
428 comparable to other suppliers of similar products. The price stability also means that the

429 prices should be stable over time. Similarly, the advanced notice of price changes means that
 430 the supplier should inform their customers in advance about price changes.

431 **Table 2: Cost Criteria**

Cost Criteria	SA	A	NS	D	SD	Mean
Percentages						
Price level	69.5	19.5	6.0	5.0	0.0	1.54
Price stability	54.5	27.5	6.5	11.5	0.0	1.25
Advanced notice of price changes	27.5	36.0	8.0	23.5	5.0	0.58
Discounts and payment terms offered	62.0	27.5	4.0	6.5	0.0	1.45

432 **Key: Strongly Agree (SA) = 2; Agree (A) = 1, Not Sure (NS) = 0; Disagree (D) = -1;**
 433 **Strongly Disagree (SD) = -2**
 434

435 4.2.2 Delivery Criteria

436 Delivery was another criteria mostly used to measure the performance of suppliers. The
 437 respondents were asked to indicate which of the criteria under delivery were used to measure
 438 the performance of suppliers. As indicated in Table 3, almost half (45.5%) of the staff of the
 439 procurement units or accounts sections of the public institutions agreed that delivery time was
 440 used to measure the performance of suppliers whilst 44.0% strongly agreed. On the other
 441 hand, 4% of the respondents disagreed that delivery time was used to measure the
 442 performance of suppliers. The mean rating obtained for this criteria of suppliers' performance
 443 assessment was 1.28, which indicates that majority of the respondents used delivery time to
 444 measure the performance of suppliers.

445 It was further ascertained that 55.0% and 43.0% of the respondents strongly agreed and
 446 agreed respectively that quantity was used to measure the performance of suppliers. None of
 447 the respondents disagreed that quantity was used to measure the performance of suppliers.
 448 With this criteria, the mean rating was 1.53 which also shows a widespread acceptance of its

usage among the respondents. Packaging was another delivery criterion used to measure the performance of suppliers in public institutions in Ghana. Table 3 shows that that 37.5% of the respondents agreed that that packaging was used to measure the performance of suppliers whilst 33.5% strongly agreed that packaging was used to measure the performance of suppliers. On the other hand, 18.0% and 3.0% disagreed and strongly disagreed respectively that packaging was used to measure the performance of suppliers. The packaging criteria to measure the performance of suppliers had a mean of 0.81. This indicates that majority of the respondents also measured the performance of suppliers by using the packaging of their products and services.

Table 3 also indicates that 44.0% of the respondents strongly agreed that the quick response of suppliers in case of emergency was used to measure the performance of suppliers and another 33.5% of the respondents also agreed that the quick response of suppliers in case of emergency was used to measure the performance of suppliers. On the other hand, 14.5% disagreed that the quick response of suppliers in case of emergency was used to measure the performance of suppliers whilst 1.0% strongly disagreed. This criteria also obtained a mean rating of 1.05, thus suggesting that it is widely used among staff as a suppliers' performance measurement criteria.

Further, 24.5% of the staff strongly agreed that the communication systems or skills (phone, fax, e-mail and internet) was used to measure the performance of suppliers. Another 43.0% of the respondents also agreed that the communication systems and skills of the suppliers was used to measure the performance of suppliers. On the other hand, 18.5% of the staff disagreed that whilst 3.5% strongly disagreed that communication systems and skills of the suppliers was used to measure the performance of suppliers. The mean rating of 0.67 obtained for this

472 criteria suggests that majority of the staff used this criteria to measure the performance of
 473 suppliers.

474 Table 3 further shows 38.5% of the respondents strongly agreed that the willingness of the
 475 suppliers to change products to meet their changing needs was also used measure the
 476 performance of suppliers. Similarly, another 41.0% of the staff agreed that the willingness of
 477 the suppliers to change products/services to meet their changing needs was also used measure
 478 the performance of suppliers. On the other hand, 9.5% of the respondents disagreed that the
 479 willingness of the suppliers to change products to meet their changing needs was also used
 480 measure the performance of suppliers. With a mean rating of 1.07, it clearly indicates the
 481 consensus among the respondents that the willingness of the suppliers to change products to
 482 meet their changing needs was also used measure their performance.

483 It can be observed that the result obtained under the delivery criteria are in consonance with
 484 the results of other studies. For instance, Weele (2010) noted that: quality level, service level,
 485 correct quantity, on-time delivery, price/cost of product, use of electronic data interchange
 486 (EDI) and willingness to share sensitive information are some of the supplier measurement
 487 criteria that can be considered. eNotes Community (2013) also confirms this by indicating
 488 that presence of certification or other documentation, flexibility to respond to unexpected
 489 demand changes, communication skills/systems (phone, fax, e-mail, Internet), quick response
 490 time in case of emergency, problem, or special request, willingness to change their products
 491 and services to meet your changing needs and willingness to participate in your firm's new
 492 product development and value analysis are other performance measurement criteria of
 493 suppliers under the delivery criteria.

494 **Table 3: Delivery Criteria**

Delivery Criteria	SA	A	NS	D	SD	Mean
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		Percentages					
	Time	44.0	45.5	5.5	4.0	1.0	1.28
	Quantity	55.0	43.0	2.0	0.0	0.0	1.53
	Packaging	33.5	37.5	8.0	18.0	3.0	0.81
	Documentation	25.0	31.0	10.5	28.5	5.0	0.43
	Presence of certification	27.5	23.0	19.5	23.5	6.5	0.42
	Quick response time in case of emergency	44.0	33.5	7.0	14.5	1.0	1.05
	Communication skills/systems (phone, fax, e-mail)	24.5	43.0	10.5	18.5	3.5	0.67
	Response to unexpected demand changes	28.5	39.0	16.5	15.0	1.0	0.79
	Willingness to change products to meet changing needs	38.5	41.0	10.0	9.5	1.0	1.07
495	Key: Strongly Agree (SA) = 2; Agree (A) = 1, Not Sure (NS) = 0; Disagree (D) = -1; Strongly Disagree (SD) = -2						
496							

497 4.2.3 Quality or Technical CapabilityCriteria

498 The respondents were further asked to indicate the various criteria used to assess the quality
499 or technical capabilities of suppliers in the public institutions in Ghana. The various criteria
500 identified were reliability, durability, fitness for purpose, less variance, meeting requirements
501 and less defective of the goods and services. As shown in Table 4, the respondents that
502 strongly agreed that reliability was a major criteria used to assess the performance of
503 suppliers was 73.5% and another 23.0% also agreed. With a mean rating of 1.70, it clearly
504 shows that the reliability of suppliers was a major criteria used to measure the performance of
505 suppliers.

506 It was further realized that the durability of the products was another criteria that was
507 employed to measure suppliers' performance. Table 4 further shows that 70% and 27.5% of
508 the respondents strongly agreed and agreed respectively that the durability of the products
509 was another criteria that was employed to measure suppliers' performance. The mean rating
510 for this criteria was 1.68, which clearly shows that the respondents widely used the durability

511 of the products was another criteria that was employed to measure suppliers' performance.
512 With regards to the 'fitness for purpose' criteria, 57.5% of the respondents strongly agreed to
513 its usage whilst 36.0% also agreed that fitness for purpose was a major criteria used to
514 measure the performance of suppliers in public institutions in Ghana. This criteria also
515 obtained a mean rating of 1.63. This also shows that majority of the respondents contended
516 that fitness for purpose was another criteria used to assess the performance of suppliers.

517 The variance of the goods and services was also ascertained to be one of the criteria used to
518 assess the technical capability and quality of the goods and services of suppliers. As shown in
519 Table 3, majority (mean = 1.63) of the respondents agreed that the rate of variance of the
520 goods and services provided by suppliers was also used to assess the performance of
521 suppliers. Another 71.5% (mean = 1.67) also strongly agreed that the rate at which suppliers
522 meet the requirements of the goods and services was also used to measure the performance of
523 suppliers.

524 Finally, the rate of defectiveness of the goods was also another criteria that was used to
525 measure the performance of suppliers. Table 4 shows that majority (62.0%) of the
526 respondents strongly agreed that the defectiveness of the goods was also another criteria that
527 was used to measure the performance of suppliers. Again, 30.5% of the respondents agreed
528 that the defectiveness of the goods and services was also another criteria that was used to
529 measure the performance of suppliers whilst 5.0% disagreed that the defectiveness of the
530 goods and services was also another criteria that was used to measure the performance of
531 suppliers. This criteria obtained a mean rating of 1.50, which shows that the respondents used
532 the level of defectiveness of products to measure the performance of suppliers in the public
533 sector in Ghana.

534 **Table 4: Quality or Technical CapabilityCriteria**

Quality or Technical Capability Criteria	SA	A	NS	D	SD	Mean
Percentages						
Reliability	73.5	23.0	3.5	0.0	0.0	1.70
Durability	70.0	27.5	2.5	0.0	0.0	1.68
Fitness for purpose	57.5	36.0	2.0	4.5	0.0	1.47
Less variance	68.5	26.0	5.5	0.0	0.0	1.63
Meeting requirements	71.5	24.0	4.5	0.0	0.0	1.67
Less defective	62.0	30.5	2.5	5.0	0.0	1.50

Key: Strongly Agree (SA) = 2; Agree (A) = 1, Not Sure (NS) = 0; Disagree (D) = -1; Strongly Disagree (SD) = -2

4.2.4 Organizational Profile Criteria

Finally, the organizational profile was the least criteria that was used to assess the performance of suppliers in the public institutions in the Brong Ahafo region of Ghana. As shown in Table 5, financial performance of the companies was not widely used by the respondents. Almost half (mean = 0.32) of the respondents used financial performance of the companies to measure the performance of suppliers. A further 12.5% and 37.0% of the respondents strongly agreed and agreed respectively that the customer base of the companies was used to measure the performance of suppliers. On the other hand, 23.0% and 10.5% of the respondents disagreed and strongly disagreed respectively that the customer base of the companies was used to measure the performance of suppliers.

The service level (mean rating = 0.60) of the respondents was also used to assess the performance of the suppliers of goods in public institutions. The profile of suppliers (mean = -0.27), ease of communication (mean = -0.25) and the ages of the firms (mean = -0.33) were however not used to measure the performance of suppliers in the public institutions in Ghana.

On the other hand, the rate at which the suppliers used technology in their operation (mean = 0.54)) was also used to measure the performance of suppliers.

Table 5: Organizational Profile Criteria

Organizational Profile Criteria	SA	A	NS	D	SD	Mean
Percentages						
Financial Performance	14.0	39.5	18.5	20.0	8.0	0.32
Customer base	12.5	37.0	17.0	23.0	10.5	0.18
Service Levels	22.	44.0	7.5	24.5	2.0	0.60
Supplier's Profile	11.0	22.0	6.0	51.5	9.5	-0.27
Ease of Communication	9.0	25.5	6.5	50.0	9..0	-0.25
Age of firm	13.5	16.0	10.5	44.0	16.0	-0.33
Use of technology	21.0	46.5	5.5	19.5	7.5	0.54

Key: Strongly Agree = 2; Agree = 1, Neutral = 0; Disagree = -1; Strongly Disagree = -2

5.0 CONCLUSION

The study employed a self-administered questionnaire to assess the various critical factors that influence the selection of suppliers in public institutions and found that the traditional suppliers' performance measurement approach based on lowest cost was widely used to measure the performance of suppliers in public institutions in Ghana. Additionally, majority of the institutions applied categorical system of performance assessment alongside the cost based system. Again, almost half of the institutions also used Analytical Hierarchical Process to assess the performance of suppliers in public institutions in the Brong Ahafo region of Ghana. However, a small number of the staff used the Weighted-Point Method to measure the performance of suppliers in their institutions.

567 With regards to the specific criteria applied to assess the performance of suppliers, it was
568 revealed that the quality or technical capabilities of the suppliers was a major factor
569 considered. Specifically, the durability, reliability, fitness for purpose and less variance of the
570 products were the criteria that influenced the choice of a supplier. Apart from quality criteria,
571 cost of products was also used to assess the performance of suppliers. With regards to the
572 cost criteria, the factors considered were price level, price stability and discounts and terms of
573 payments offered by the suppliers. The delivery ability of the suppliers was also another
574 criteria used to select suppliers. The specific criteria considered here were delivery time,
575 quantity, packaging, response to emergency and willingness of suppliers to change products
576 to meet changing needs.

577 The public institutions in addition hardly used the organizational profile of suppliers' to
578 assess the performance of suppliers. However, the financial performance, customer base and
579 the use of technology by suppliers were sparsely used by the public institutions to assess the
580 performance of suppliers. This study makes contribution to procurement practices in Ghana
581 by providing information on how suppliers' performance are measured in public institutions,
582 an important but neglected area of study in Ghana.

583 It is recommended that the management of these institutions should provide modern
584 performance management tools such as IBS's Emptoris, Ariba, Ecnnet, and superdecision or
585 mathematical software such as Microsoft Excel, Oracle, SAP, Maple etc. to enable effective
586 assessment of suppliers' performance in these institutions. This study has provided valuable
587 information on how suppliers' performance are measured in public institutions. It is however
588 recommended that further studies must be conducted to assess the performance of suppliers
589 in public institutions by the application of the various evaluation methods provided in this
590 study.

591

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