Executives' Reactions to a Prescriptive Strategic Procurement Planning Model

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Abstract

Procurement has recently received increased corporate recognition, and its responsibilities have significantly expanded. Hence, a need has arisen for conceptual, integrative models that assist purchasing executives to more effectively manage their increased responsibilities in a dynamic environment. One such model is the Product Life Cycle (PLC) concept. Recently, two researchers formulated a set of procurement strategies for each PLC stage, which they recommended purchasing managers implement. To test this model, practitioners from five chapters of the Institute for Supply Management were asked to indicate the importance level and usage frequency of each procurement strategy. Almost 81% of the 145 purchasing strategies were rated "important" or higher by respondents, and about 58% were "used frequently" or more often. Executives were also asked to assign each procurement strategy to the sales phase they thought most appropriate. Their assignments matched almost 60% of the prescriptive model. Above-average assigners were more likely than their average/below-average counterparts to have worked 13 or more years in procurement, earned a college degree, and majored in business or purchasing as well as be professionally certified (i.e., CPM) and at least a manager or higher. Limitations and implications are discussed.

Keywords: Procurement, Strategic Procurement Planning, Product Life Cycle (PLC), Purchasing Strategies, PLC-Procurement, Strategy Models

Introduction

During the past several decades, the procurement function has received increased recognition and status as evidenced by its elevation to the corporate ranks in many organisations (Freeman & Cavinato, 1990; Heberling, 1993; Rajagopal & Bernard, 1993; Tully, 1995; Trommer, 1997; Carr & Pearson, 2002; Ellram et al., 2002; Trent & Monczka, 2002; Ball, 2004; Day & Lichtenstein, 2006; Hawkins, 2006; den Butter & Linse, 2008; Hofmann, 2010; Blascovich *et al*., 2011). Along with this notoriety, purchasing's role has significantly expanded. Procurement managers now command greater decision-making authority, are more active in developing and implementing strategies for different departments, and participate in formulating corporate policies and strategies (Burt & Sukoup, 1989; Pearson & Gritzmacher, 1990; Adamson, 1991; Cavinato, 1991; Monczka, 1992; Watts *et al*., 1992; Gadde & Hakansson, 1994; Spekman, 1994; Biemans & Brand, 1995; Carter & Narasimhan, 1996; Ferguson *et al.*, 1996; Goh *et al*., 1999; Carr & Smeltzer, 2000; Cousins & Spekman, 2003; Tassabehji & Moorhouse, 2008).As a result, a need has arisen among purchasing executives for integrative, conceptual models that assist them to more effectively manage their increased responsibilities in a dynamic environment. One such model is the Product Life Cycle (PLC) concept.

Product Life Cycle Concept

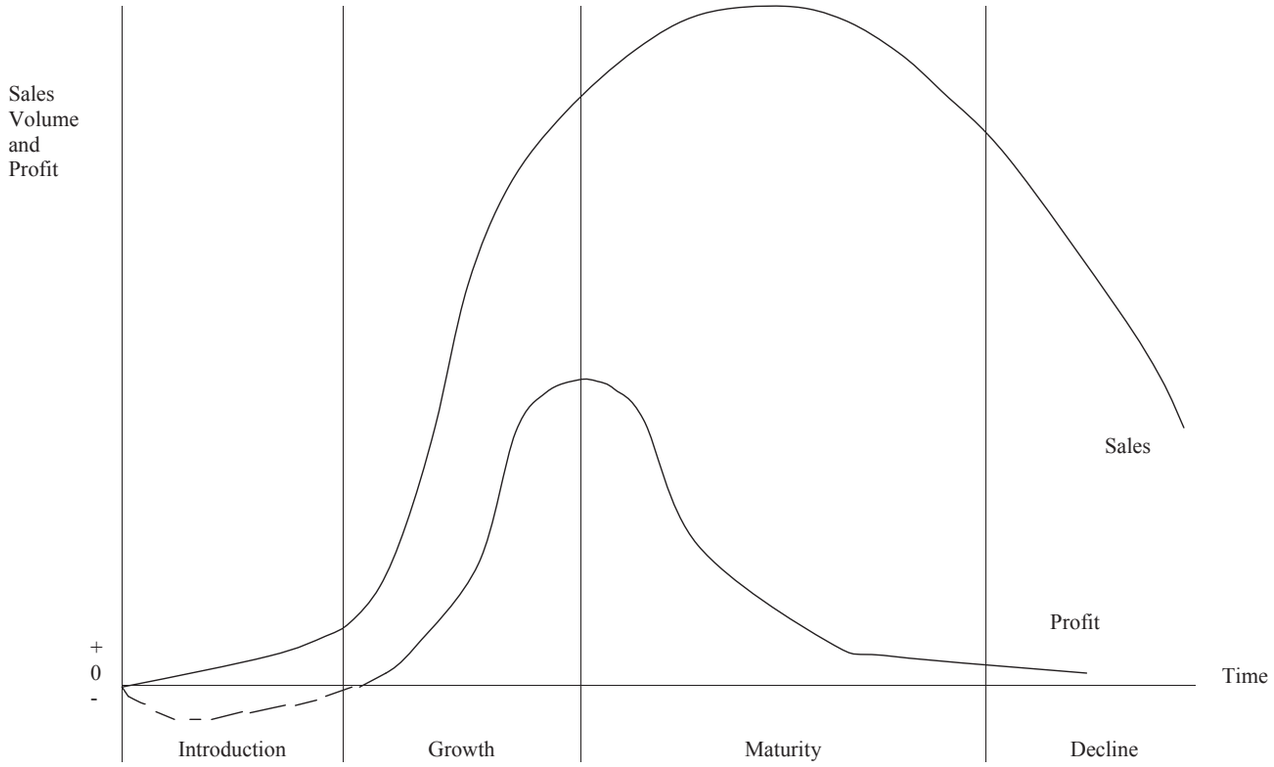
The product life cycle (PLC) represents the unit sales trend of a narrowly defined product from the time it is introduced into the marketplace until it is later withdrawn. Schematically, the PLC may be approximated by a bell-shaped curve that is divided into several stages (Kotler & Keller, 2012).For purposes of this study, the researcher adopted the same four-stage PLC used by Rink & Fox (2012)--Introduction, Growth, Maturity, and Decline. Appendix A summarizes the major characteristics of each of these stages. Fig. 1 presents a generalized PLC curve.

PLC-Procurement Strategy Models

The dependence of procurement strategies on a product's sales trend was originally conceived by Berenson (1967). He formulated 34 purchasing strategies, which he recommended procurement executives implement across stages in the PLC.

During personal interviews with 30 purchasing practitioners, Rink (1975) asked them to assign each of Berenson's 34 strategies to the PLC stage they felt was most appropriate. Executives' assignments matched

Fig 1: A Generalized Product Life Cycle Curve



almost 55% of Berenson's prescriptive model.Of the remaining procurement strategies, managers wanted to implement about two-thirds of them one sales phase sooner than recommended.Taking this into account, practitioners' assignments "reasonably" matched over 75% of Berenson's model.

On the basis of this research and business experience, Fox & Rink (1977) substantially expanded Berenson's normative model to include 83 purchasing strategies.In addition to segregating these strategies by PLC stage, the authors classified them by nine departmental functions (e.g., production, R & D, and accounting). As a result of these past works, discussions with organisational buyers over the years, and additional research, Rink & Fox (2012) revised, updated, and extended their original model.The end result was 145 procurement strategies categorised across four PLC stages-Introduction, Growth, Maturity, and Decline. These strategies are summarized in Appendix B.

Purpose

The purpose of this paper is to empirically determine the feasibility of the Rink & Fox PLC-PS model in assisting purchasing executives to implement timely procurement strategies across the sales cycle of their company's product. This was accomplished by asking a sample of purchasing practitioners to indicate the importance level and usage frequency of each of the prescribed 145 PSs. These managers were also asked to assign each procurement strategy to the PLC stage they thought most appropriate.

Methodology

In assessing the applicability of Rink & Fox's model, the researcher realized an inordinate amount of time would be required for procurement executives to evaluate all 145 PSs.Consequently, each strategy was randomly assigned to one of three questionnaire versions (A, B, or C).This reduced the number of purchasing strategies to be assessed by each procurement manager from 145 to approximately 48. Balance in the number of strategies across questionnaire versions by PLC stage was maintained. Finally, the order of these PSs was randomised.

The researcher's previous experience with purchasing professionals indicated few fully understand the PLC concept.Most tend to perceive it from an engineering perspective rather than a marketing one.That is, these practitioners view PLC in terms of durability, or how long

a product physically lasts, instead of a unit sales curve.As a result, Appendix A was enclosed in each out-going mail packet.

In the cover letter, potential respondents were asked to first read Appendix A.Then, they were instructed to specify on their questionnaire version one of their firm's major products with which they had had procurement experience.Next, keeping this product in mind, executives were invited to indicate for each PS the: (1) Importance level, using a four-point scale where 4=Very important, 3=Important, 2=Somewhat important, and 1=Not important; and (2) Usage frequency, using a four-point scale where 4=Used all of the time, 3=Used frequently, 2=Used occasionally, and 1=Not at all.In addition, managers were asked to assign each PS to the most important PLC stage for their specified product, as if this was the only item their company manufactured. Finally, practitioners were requested to provide relevant demographic information about themselves (e.g., number of years in purchasing) and their organisations (e.g., number of employees).

Each version of the questionnaire was structured and undisguised. The questions were of the fixed alternative variety, which ensured respondents were answering the same questions and in the same sequence for each type. Excluding some wording changes, pretests of the questionnaire versions with local procurement managers revealed no major problems.

The sampling frame adopted for this study was the membership roster of five Midwestern chapters of the Institute of Supply Management (ISM). Along with Appendix A, one of the three questionnaire versions was mailed to each of the 528 purchasing practitioners. Balance in the number of questionnaire versions across ISM chapters was maintained. Of the 122 questionnaires returned, six were discarded for being incomplete.This resulted in 116 usable returns accounting for a 22% response rate. Of these, 36 were Version A, 42 were Version B, and 38 were Version C of the questionnaire.

Results

As a preliminary form of analysis, three separate independence tests were performed on the data.At the 0.05 level, no significant differences were found across respondents' replies among the five Midwestern ISM chapters, dates questionnaires were returned, and questionnaire versions.This permitted the researcher to aggregate practitioners' responses into one data set for subsequent analyses.

Importance Level and Usage Frequency

The overall average importance level and usage frequency of the prescribed 145 PSs were 3.41 (where 4=Very important) and 2.99 (where 4=Used all of the time), respectively. Across these 145 PSs, average importance levels and usage frequencies ranged from 2.16-3.89 and 1.59-3.76, respectively.For each PS, the average importance level exceeded the average usage frequency (Table 2).

Of the 145 PSs, 84 (or almost 58%) were rated by respondents as "important" or higher and "used frequently" or more often. Slightly more than 57% (or 48) of these 84 strategies were vendor-related.This was not a surprising finding. Suppliers represent the external group purchasing executives interact with the most and on a regular basis either directly (e.g., PS#s 16, 28, 42, 72, 88, 126, and 145) or indirectly (e.g., PS#s 31, 34, 45, 59, 63, 71, and 122).Of the remaining 36 strategies, slightly more than 58% (or 21) were inter-departmental in nature (e.g., PS#s 3, 26, 35, 54, 119, and 139).The remaining strategies (or 15 strategies) were non-vendor, procurement-oriented (e.g., PS#s 10, 68, 78, 94, 110, and 118) (Table 2).

About 23% of the 145 PSs (or 33) were evaluated as "important" or higher and "used occasionally" or less often. Almost 55% of these 33 strategies (or 18) were inter-departmental in nature (e.g., PS#s 11, 50, 55, 70, 114, 124, 129, and 143).Slightly more than 27% of these strategies (or 9) were vendor-related (e.g., PS# 30, 37, 77, 95, 99, and 133).The majority of the remaining strategies were efficiency-oriented; they assisted managers in the effective performance of their purchasing responsibilities (e.g., PS#s 103, 106, 109, and 115) (Table 2).

Almost 20% of the 145 PSs (or 28) were rated as "somewhat important" or lower and "used occasionally" or less often. About 80% of these strategies involved inter-company and external activities, or relationships not directly related to procurement (e.g., manufacturing, engineering, accounting, legal, government, etc.), which might explain why these PSs were evaluated low on both measures (e.g., PS#s 9, 13, 44, 58, 79, 120, 131, and 134). The researcher was surprised at the low usage rating two strategies received (i.e., PS#s 66 and 84), because purchasing executives are usually more involved with "using brokers to find scarce items" and "revising product specifications".Interestingly, respondents accorded low usage scores to those strategies having to do with departmental efficiency (i.e., PS#s 80, 104, 108, and 112) (Table 2). Few practitioners volunteered written

comments, and none provided insight regarding these apparent disparities.

Of the two scales--importance and usage, the latter seemed to represent a more accurate indicator of respondents' assessment of the feasibility of these 145 PSs (and hence the normative model).That is, almost 81% of the 145 PSs were rated as "important" or higher. About 58% were "used frequently" or more often by procurement executives in implementing purchasing strategies in their organisations (Table 2).

Assignment of PSs

Initially, the researcher desired to determine to which PLC stage procurement professionals did assign each purchasing strategy relative to the Rink & Fox model. This was accomplished by formulating a contingency table where the rows represented "PLC Stage Suggested by Rink & Fox Model" for some particular strategy, and the columns symbolized "PLC Stage Assigned by Executives" to that PS. A bivariate distribution was then developed for each manager according to these two criteria.Finally, these distributions were summed.

If respondents were agreeing perfectly with Rink & Fox's model, the diagonal values would be 100%. Intuitively, any value near to or above 50% would seem to represent general confirmation of this model. As shown in Table 1, only one of the four diagonal values strayed significantly from this notion.That is, 35% of the purchasing strategies suggested as belonging to the Maturity phase by Rink & Fox were classified as such by procurement managers, while 42% of these strategies were assigned to the Growth stage.Interestingly, except for the Introduction phase, practitioners tended to implement strategies one phase sooner than recommended.These results indicate while purchasing executives were not "perfect" in their assignment of strategies to PLC stages, they were certainly "on target" most of the time.

Next, the null hypothesis that PLC stage is independent of each procurement strategy was tested.This is basically a test of whether managers were randomly assigning each PS to one of four PLC stages. In developing the contingency table for this analysis, a frequency distribution of each practitioner's assignment of PSs by sales phase was developed.Then, these distributions were summed. Finally, a one-sample chi-square test was performed on each strategy. At the 0.05 level, the null hypothesis of random assignment was rejected for 137 of the 145 PSs, as shown in the last column of Table 2. Almost 95% of the 145 procurement strategies were not assigned to PLC stages in a random fashion; in fact, a distinctive pattern prevailed in most cases.

Having found respondents were not randomly classifying purchasing strategies to sales phases, the researcher wanted to determine how these patterns coincided with the Rink & Fox model.This was achieved by evaluating the percentage distribution of managers' responses for each strategy relative to the prescriptive model.Using 50% as a "rough" standard of comparison, it can be seen from Table 2 that 86 of the 145 PSs (or almost 60%) equaled or exceeded this criterion.This means executives assigned about two-thirds of the prescribed 145 PSs to the PLC stage recommended by Rink & Fox.

Finally, the researcher wanted to ascertain the individual and company demographic characteristics of above-average classifiers of procurement strategies to sales phases.The average number of PSs correctly assigned relative to the Rink & Fox model was 28.7. (As mentioned earlier, each respondent evaluated only one-third of the 145 PSs.) Using this figure, purchasing practitioners were segregated into one of two categories-above-average classifiers, or average/below-average classifiers. Next, cross-tabulations of various individual and company demographics were developed. Finally, chi-square tests were performed.

Table 1: Product Life Cycle Stage where Respondents Assigned Procurement Strategies

		Product Life Cycle Stage Assigned by Executives			
		Introduction	***Growth***	***Maturity***	***Decline***
PLC Stage	Introduction	53%	34%	8%	5%
Suggested	Growth	24	61	12	3
by Rink and	Maturity	15	42	35	8
Fox Model	Decline	9	15	31	45

Table 2: Importance Level, Usage Frequency, Percentage Distribution of Executives' Assignments of each Purchasing Strategy across PLC Stages, and Chi-Square Test

PS #[a]	*Purchasing Strategy*	*Importance*[b]	*Usage*[c]	*Percentage Distribution of Executives' Assignments*[e]				*# of Execs*	*Chi-Square*[f]
				I[d]	*G*	*M*	*D*		
1	Evaluate custom shops as vendors	3.76	3.58	*69%	19%	6%	6%	36	39.8[g]
2	Urge Engineering to create new specs	3.88	3.71	*66	26	8		38	39.3[g]
3	Use existing materials in new product	3.72	3.59	*63	18	18		38	32.9[g]
4	Suggest in-house assembly of product	2.19	1.68	*61	25	14		36	29.6[g]
5	Anticipate changing materials' needs	3.65	3.42	*38	31	29	2	42	12.3[g]
6	Obtain materials samples for testing	3.84	3.67	*55	24	21		38	23.7[g]
7	Make-or-buy analysis for new product	3.63	3.46	*50	31	19		42	22.2[g]
8	Relegate unit costs to obtain trial orders	3.86	3.69	*62	31	7		42	39.3[g]
9	Screen new product for compliance	2.54	2.13	*53	32	16		38	23.1[g]
10	Evaluate equipment proposals	3.73	3.59	*72	22	6		36	46.7[g]
11	Determine whether to implement MRP	3.18	2.73	*67	25	8		36	38.0[g]
12	Get licenses for hazardous materials	2.32	1.67	*50	28	22		36	18.2[g]
13	Assist in financial planning of new item	2.43	1.59	*61	29	11		38	32.1[g]
14	Purchase various parts in small amounts	3.87	3.62	*64	19	14	3	36	31.1[g]
15	Develop list preferred suppliers	3.82	3.60	*55	29	17		42	26.8[g]
16	Resolve materials defects with vendors	3.79	3.61	*61	26	13		38	30.8[g]
17	Prepare to handle Engineering changes	2.16	1.63	*55	24	19	2	42	24.1[g]
18	Use subcontractors until item accepted	3.62	3.37	*66	26	8		38	39.3[g]
19	Monitor sales reports for new item	3.37	2.96	*50	29	16	5	38	16.9[g]
20	Develop cost standards for new item	3.64	3.48	*61	19	19		36	28.7[g]
21	Plan orderly shift to owned facilities	3.48	3.05	*29	38	33		42	14.8[g]
22	Consolidate small-quantity orders	2.56	1.69	*47	25	19	8	36	11.6[g]
23	Contact preferred vendors	3.71	3.12	*36	53	11		36	24.7*
24	Arrange for leases with options to buy	3.63	3.04	*53	32	16		38	23.1[g]
25	Identify materials trends of new designs	2.95	2.24	*50	26	24		42	21.0[g]
26	Develop quality standards for materials	3.73	3.35	*52	29	19		42	23.9[g]
27	Determine supply/demand of materials	3.56	3.12	*16	50	34		38	21.6[g]
28	Educate vendors on new item's specs	3.68	3.37	*50	31	19		36	18.7[g]
29	Ask suppliers to identify their costs	3.57	3.41	*56	31	14		36	24.7[g]
30	Conduct pre-purchase survey of needs	3.39	2.98	*12	57	31		42	31.3[g]
31	Contact prospective vendors	3.84	3.67	*55	33	12		42	29.4[g]
32	Assist vendors with quality assurance	3.60	3.12	*26	42	32		38	14.6[g]
33	Furnish tooling to vendors, if necessary	3.73	3.25	*28	44	28		36	14.7[g]
34	Develop vendor invoice audit policy	3.62	3.19	*50	39	11		36	23.6[g]
35	Set reorder points, etc. for new item	3.46	3.01	*52	33	14		42	26.2[g]
36	Create materials quality monitoring	3.61	3.36	*61	32	8		38	33.8[g]
37	Assess new vendors' financial strength	3.48	2.93	*31	45	24		42	18.0[g]
38	Balance new product failure likelihood	3.69	3.15	*62	31	7		42	39.3[g]
39	Determine whether to implement TQM	3.54	3.01	*25	42	33		36	14.0[g]
40	Use PERT to assemble materials	3.77	3.18	*58	31	11		36	28.2[g]
41	Check Marketing's plans new product	3.23	2.83	*53	26	21		38	21.4[g]
42	Solicit and evaluate vendors' quotes	3.72	3.50	*33	36	31		42	14.2[g]
43	Request & evaluate vendors' lead times	3.63	3.19	*31	40	29		42	15.3[g]
44	Ask Marketing about design changes	2.86	1.98	*13	39	42	5	38	15.7[g]
45	Work with IT on communications	3.57	3.13	*17	28	39	17	36	4.9

(Contd.)

PS #[a]	Purchasing Strategy	Importance[b]	Usage[c]	Percentage Distribution of Executives' Assignments[e]				# of Execs	Chi-Square[f]
				I[d]	G	M	D		
46	Pare materials orders to present vendors	3.61	3.21	*50%	29%	21%		42	21.4[g]
47	Monitor progress of new product	3.18	2.87	*53	33	14		36	22.9[g]
48	Consider financing vendors' needs	2.82	1.76	*52	29	19		42	23.9[g]
49	Ensure vendors incorporate changes	3.87	3.62	*50	39	11		38	25.4[g]
50	Consult Traffic on materials routing	3.29	2.74	*29	34	32	5%	38	8.1[g]
51	Urge vendors develop new technologies	3.41	3.18	*29	42	29		38	14.4[g]
52	Monitor customer feedback new item	3.38	2.96	*50	38	12		42	26.8[g]
53	Work with vendors resolve complaints	3.86	3.70	*42	36	22		36	14.9[g]
54	Plan storage of hazardous materials	3.61	3.29	*21	45	33		42	18.8[g]
55	Plan workers' training hazardous mtls.	3.40	2.89	*14	47	39		36	20.7[g]
56	Prepare for changing govt. regulations	2.78	1.89	*8	42	39	11	38	15.3[g]
57	Select vendors for hazardous materials	3.69	3.48	*34	34	32		38	12.7[g]
58	Determine whether to implement JIT	2.87	2.39	*17	50	33		42	23.3[g]
59	Create vendor certification program	3.55	3.12	*53	32	16		38	23.1[g]
60	Selectively widen sources	3.72	3.39	7	*60	33		42	37.0[g]
61	Keep quality despite need for materials	3.69	3.44	13	*53	34		38	24.5[g]
62	Build materials inventories	3.40	2.92	5	*57	38		42	37.6[g]
63	Expand staff handle more requisitions	3.72	3.45	11	*56	33		36	26.2[g]
64	Shift to large-volume vendors	3.73	3.43	8	*53	39		36	26.9[g]
65	Phase out some subcontractors	3.56	3.20	5	*38	50	7	42	25.6[g]
66	Use brokers to find scarce materials	2.94	2.57	34	*58	5	3	38	31.3[g]
67	Ask Legal to ensure firm's rights	3.78	3.61	24	*43	33		42	17.0[g]
68	Avoid overbuying materials	3.71	3.53	11	*53	36		36	24.7[g]
69	Have IT improve vendor info exchange	3.63	3.19	14	*50	36		36	21.6[g]
70	Revise lead times, reorder points, etc.	3.42	2.98	19	*33	36	11	36	6.0
71	Urge fast payment of vendors' invoices	3.85	3.69	21	*56	24		38	23.7[g]
72	Use high-level contacts to get materials	3.57	3.16	29	*52	19		42	23.9[g]
73	Expedite vendors' shipments	3.87	3.71	16	*50	34		38	21.6[g]
74	Cooperate in installing EOQs	3.36	2.97	10	*43	48		42	28.5[g]
75	Make/buy analysis on fast selling item	3.57	3.04	11	*53	37		38	26.4[g]
76	ABC inventory analysis on materials	3.49	3.01	11	*39	42	8	36	13.6[g]
77	Consider buying ownership in vendors	3.18	2.62	13	*50	37		38	23.3[g]
78	Use blanket POs for repetitive ordering	3.53	3.29		*47	50	3	38	34.2[g]
79	Determine expansion of mftg. facilities	2.85	2.39	11	*34	55		36	29.6[g]
80	Evaluate departmental effectiveness	2.81	2.17	5	*36	40	19	42	13.4[g]
81	Increase staff more tracing requests	3.74	3.56	6	*53	39	3	36	26.4[g]
82	Ask Marketing about line extensions	2.62	1.98	8	*63	29		38	36.3[g]
83	Develop mix of dispersed vendors	3.73	3.20	14	38	*48		42	23.9[g]
84	Cooperate in revising product standards	2.93	2.48	13	37	*47	3	38	19.5[g]
85	Urge use of interchangeable parts	3.67	3.39	47	28	*14	11	36	11.8[g]
86	Assist in assessing whether revise MRP	3.08	2.56		28	*50	22	36	18.2[g]
87	Help evaluate replacing old equipment	2.92	2.31		28	*58	14	36	29.6[g]
88	Encourage vendors' cost-saving ideas	3.57	3.18		29	*67	5	42	46.8[g]
89	Try to shift inventories to suppliers	3.59	3.21	13	34	*37	16	38	6.8
90	Get prices reduced based on experience	3.63	3.28		45	*53	3	38	34.6[g]
91	Replace vendors' tooling, if necessary	3.71	3.29		32	*58	11	38	29.8[g]
92	Pursue vendors' discounts	3.88	3.76	6	39	*50	6	36	22.7[g]
93	Preserve quality despite cost pressures	3.72	3.50	17	36	*44	3	36	15.3[g]
94	Make/buy analysis stable demand item	3.58	3.16	17	17	*61	6	36	26.2[g]
95	IT make info exchange more efficient	3.29	2.78	21	29	*39	11	38	6.8
96	Cancel overdue POs	3.66	3.34	11	39	*50		36	23.6[g]
97	Adjust quality to fit customers' needs	3.33	2.98	14	40	*31	14	42	8.5[g]

(Contd.)

PS #[a]	Purchasing Strategy	Importance[b]	Usage[c]	Percentage Distribution of Executives' Assignments[e]				# of Execs	Chi-Square[f]
				I[d]	G	M	D		
98	Defend firm's rights in vendor disputes	3.89	3.74	17%	36%	*33%	14%	36	5.6
99	Give preference to vendors/customers	3.67	2.80	50	25	*19	6	36	14.9[g]
100	Improve buyers' negotiation techniques	3.41	2.63	18	50	*32		38	20.3[g]
101	Stabilize materials commitments	3.50	3.05	7	38	*55		42	33.6[g]
102	Long-term contracts with fewer sources	3.63	3.29	3	44	*53		36	36.7[g]
103	Delegate routine buying to new buyers	3.24	2.78		33	*60	7	42	37.4[g]
104	Develop internal suggestion system	2.68	1.93	19	36	*40	5	42	13.4[g]
105	Centralize some purchasing at HQ	3.20	2.21	5	47	*47		38	30.6[g]
106	Split up buying assignments	3.49	2.68		45	*52	2	42	38.6[g]
107	Evaluate usefulness of reports	3.17	2.52	17	31	*50	3	36	17.6[g]
108	Evaluate efficiency of Purchasing	2.88	2.47		26	*62	12	42	36.3[g]
109	Use new buying techniques	3.52	2.93		33	*57	10	42	33.0[g]
110	Monitor possible supply disruptions	3.54	3.25	21	38	*29	12	42	6.2
111	Use some alternative suppliers	3.33	2.84	11	42	*47		38	24.7[g]
112	Implement dept. cost reduction efforts	2.96	2.54	11	37	*39	13	38	10.6[g]
113	Urge shippers to reduce freight rates	2.72	1.89	11	34	*45	11	38	13.6[g]
114	Work with Traffic to reduce costs	3.22	2.73		11	*58	31	36	28.2[g]
115	Use trade associations as clearinghouses	3.34	2.85		24	*26	50	42	21.0[g]
116	Collect trade show info for firm	3.29	2.76	19	33	*48		42	20.9[g]
117	Research substitute materials	3.61	3.07	11	32	*42	16	38	9.6[g]
118	Conduct Commodities study	3.41	3.02	11	37	*39	13	38	10.6[g]
119	Perform value analyses	3.32	3.17	8	42	*42	8	38	17.8[g]
120	Do benchmark study of competitors	2.66	1.97		40	*52	7	42	32.5[g]
121	Obtain costs of substitute materials	3.58	3.19	6	36	*47	11	36	17.1[g]
122	Price-cost analysis of vendors' inputs	3.72	3.58	11	22	*53	14	36	15.8[g]
123	Substitute mtls. meet govt. regulations	2.95	2.59	5	37	*50	8	38	22.0[g]
124	Get hazardous substitute mtls. permits	3.49	2.98	2	36	*55	7	42	30.8[g]
125	Handling of hazardous substitute mtls.	2.96	2.52		21	*53	26	38	21.4[g]
126	Vendors & hazardous substitute mtls.	3.61	3.21	5	34	*55	5	38	27.1[g]
127	Explore importing labor-intensive parts	2.97	1.92	13	42	*37	8	38	13.2[g]
128	Shift to replaceable resources	3.47	2.96	22	28	*36	14	36	3.8
129	Urge Engineers use recycled materials	3.10	2.73	2	26	*62	10	42	35.5[g]
130	Expect fractionating purchasing	3.56	3.13	6	47	*47		36	28.7[g]
131	Assist in revising TQM program	2.96	2.30		32	*50	18	38	20.3[g]
132	Cooperate in revising JIT program	2.89	2.27		40	*52	7	42	32.5[g]
133	Investigate alternative supply sources	3.34	2.81	3	39	*53	6	36	26.4[g]
134	Have IT computerize reordering	3.71	3.42	5	45	*50		42	34.8[g]
135	Enforce input standards as sales drop	3.69	3.16	5	8	39	*47	38	21.2[g]
136	Adjust EOQs to reflect decreasing sales	3.57	3.05		21	29	*50`	38	19.5[g]
137	Screen requisitions for faltering product	3.76	3.62	12	2	24	*62	42	34.4[g]
138	Accurate forecasts are important	3.45	3.13	13	26	39	*21	38	5.6
139	Revert to subcontracting	3.71	3.50	10	21	26	*43	42	9.6[g]
140	Sell excess materials and inventories	3.89	3.67	10	2	40	*48	42	25.2[g]
141	Dispose obsolete/hazardous materials	3.82	3.64		17	31	*53	36	21.6[g]
142	Assign dept. personnel other duties	3.24	2.89		10	29	*62	42	37.6[g]
143	Keep adequate spare parts inventories	3.33	2.91		8	31	*61	36	32.2[g]
144	Legal reviews transfer commitments	2.98	2.43	8	11	17	*64	36	29.6[g]
145	Notify suppliers of product's demise	3.78	3.61	11	17	19	*53	36	15.3[g]

* PLC stage purchasing strategy should be assigned according to Rink & Fox model (Appendix B).

[a]Purchasing strategy (PS) numbers correspond to those in Appendix B.

[b]A four-point importance scale was employed, where 4=Very important, 3=Important, 2=Somewhat important, and 1=Not important.

[c]A four-point usage scale was employed, where 4=Used all the time, 3=Used frequently, 2=Used occasionally, and 1=Not used.

[d]PLC stages are coded as: I=Introduction; G=Growth; M=Maturity; and D=Decline.

[e]Due to rounding, the percentage distribution of executives' assignments of some strategies may not total 100%.

[f]Critical Chi-Square value is 7.82 for 3 degrees of freedom and alpha of 0.05.

[g]$p<0.05$.

As shown in Table 3, respondents' classification of PSs across PLC stages relative to the normative model appears to have been influenced by five of their seven demographic variables: education level, number of years worked in purchasing, professional certification, job title, and college major. That is, 61% of the people with a college education were above-average classifiers while only 37% of those with some college education or less were. (Of those who were college graduates, about two-thirds who majored in business or purchasing were above-average assigners while only one-third of those who did not major in business or purchasing were.) Almost 64% of the respondents who had worked more than 13 years in purchasing were above-average classifiers while only 34% of those who had worked less than 6 years were.About 58% of the individuals possessing CPM designation were above-average assigners while only 37% of those not possessing CPM designation were. Almost 62% of the people who had job titles of "manager or above" were above-average classifiers while only 41% of those who had job titles of "buyer" were. The common denominator among these five individual demographic variables is "experience" and "education". However, classification of PSs across PLC stages relative to the prescriptive model did not appear to be influenced by respondents' gender or dollar amount they purchased; or their company's demographic variables (i.e., number of employees, manufacturing versus non-manufacturing, and manufacturer of raw materials versus component parts/final product).

Limitations

The obvious limitation of this study was the small number of respondents (i.e., 116). Another was the selection of five Midwestern chapters of ISM to survey. In all likelihood, these two limitations negatively impacted the representativeness of the sample.This, in turn, probably reduced the generalizability of the study's results beyond the specific geographic region.While not a severe limitation, the importance level and usage frequency of each PS were measured using four-point scales, which might not qualify the results for interval-scaled statistics (e.g., mean), whereas five-point scales would. Finally, the researcher had a concern regarding the Rink & Fox model itself. Some of the 145 PSs appear to be more tactical than strategic in orientation while others seem to represent descriptions of conventional tasks of a properly functioning procurement department instead of strategies (e.g., PS#s 6, 17, 31, 50, 73, 96, 112, and 142 in Appendix B).

Conclusions and Implications

A sample of procurement executives from five Midwestern chapters of the Institute for Supply Management rated almost 81% of the 145 PSs in Rink & Fox's PLC-PS model as "important" or higher.About 58% of the 145 PSs were "used frequently" or more often by these managers in implementing purchasing strategies for one of their organisations' products.Practitioners' assignments of 145 PSs to sales phases matched almost 60% of the prescriptive model.Taken together, these endorsed purchasing strategies represent potential inputs for firms' policy manuals, or standard procedures, to foster procurement effectiveness as well as inter-functional cooperation.

At any one company, the useful number of purchasing strategies could presumably be increased by a longer period of orientation and experimentation, encouragement of feedback from managers of procurement and other functions, and endorsement by top management.The widespread problems of rising materials costs, intensifying global competition, added product complexity, and rapidly changing technology as well as increasing demands on cost reduction, maintenance of input quality, and integrated materials planning make such functional alignment in conformance with overall objectives a project of high priority. In such an endeavor, the prescriptive model, or its verified portions, could serve as a point of departure. Every organisation has a distinct set of resources, structural elements, and objectives.Hence, its standard purchasing strategies must be tailor-made.

In that connection, it is of little practical importance whether the majority, or some lesser part, of the Rink & Fox model was supported. But, it does hold academic interest. Further research should be conducted to determine the stability of all answers, and the conditions of affirmation or non-affirmation. Disagreement with the normative model may reflect one or more of the following reasons: authors' classification is not correct; respondents' assignment is wrong; purchasing strategy is either incorrectly stated or needs updating/revision; or company's structure requires an exception from the norm.Confirmed research results could then lead to construction of a multi-dimensional PLC-based procurement strategy model, which shows current operations and the conditions under which they apply.

Meantime, this study demonstrates to top management the potential value and limitations of the Rink & Fox model as an integrating tool with respect to purchasing. Success in this area should encourage similar efforts with

Table 3: Individual and Company Demographic Profile of Above-Average andAverage/Below-Average Classifiers

Variable and Categories	*Above-Average (n=55)*	*Average/Below-Average (n=61)*	*Base*	*Chi-Square Value*[a]
Gender				
Female	45%	55%	29	
Male	48	52	87	0.10
Education Completed				
≤ Some college	37%	63%	67	
College	61	39	38	6.52[b]
>Masters	64	36	11	
Number of Years in Purchasing				
< 6 years	34%	66%	44	
6-13	49	51	39	6.63[b]
>13 years	64	36	33	
CPM or Non-CPM				
CPM	58%	42%	59	
Non-CPM	37	63	57	5.03[b]
Job Title				
Buyer	41%	59%	82	
Manager or above	62	38	34	3.94[b]
Dollar Amount Purchased				
High	53%	47%	34	
Medium	53	47	40	2.30
Low	38	62	42	
Number of Employees in Firm				
Large	40%	60%	15	
Medium	57	43	37	1.97
Small	44	56	64	
NAICS				
Non-Manufacturing	38%	62%	47	
Manufacturing	55	45	69	2.62
College Major	(n=25)	(n=24)		
Business/Purchasing	65%	35%	31	
Non-Business	33	67	18	4.45[b]
Manufacturing	(n=33)	(n=36)		
Raw Materials	43%	57%	28	
Component Parts/Final Product	51	49	41	0.68

[a] Critical Chi-Square value for alpha of 0.05 for independent variables with two categories is 3.84 for 1 degree of freedom; and for independent variables with three categories, it is 5.99 for 2 degrees of freedom.

[b] $p<0.05$.

PLC models specialized in other functions.This study also indicates to procurement executives that deeper knowledge and deliberate use of the PLC concept, or of firm-relevant portions of the prescriptive model, could help them formulate and implement more timely purchasing strategies as well as effectively integrate and coordinate their basic and expanding responsibilities. Of course, an accepted normative PLC-PS model could be an invaluable tool for orienting newcomers, training candidates for advancement, and providing refresher courses to experienced personnel.Finally, procurement is inter-twined with all functions of the firm (Kotler & Keller, 2012); therefore, managers from other areas could benefit from the Rink & Fox model as well.

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Appendix A: Major Characteristics of each Product Life Cycle Stage[A]

At the beginning of the Introduction Stage, the company develops a new product, which requires a variety of materials in small quantities.The purchasing manager seeks flexibility, because of the innovation's uncertain future.Tentative or reversible procurement decisions are desired.Even with full-scale marketing of the new product, unit sales tend to be low and net losses occur. Purchasing policy seeks to balance the high likelihood of the innovation's failure with the urgency of adequate resources if it succeeds.This phase ends when top management decides to either withdraw the new product from the market or support it.

When the product's unit sales increase rapidly, it has entered the Growth Stage. Production ramps up to meet this demand.Profits increase dramatically.Procurement pleads with vendors for quicker and larger deliveries while trying to enforce quality standards.

The Maturity Stage occurs when the product's unit sales level off and decrease slightly.With many aggressive competitors, the company is forced to reduce the price, increase advertising, and develop new models, if it wishes to continue selling the product.This cost-price squeeze causes profits to fall significantly.Purchasing joins other functions within the firm in a company-wide quest for efficiency. Procurement also stabilizes the organisation's materials commitments.

When unit sales decrease rapidly, the product has entered the Decline Stage.Customers forsake the firm's product for newer ones.Retrenchment is mandatory. Purchasing seeks true cost eliminations, not cost reassignments (e.g., selling manufacturing equipment).It is only a matter of time until top management withdraws this product from the market.

Appendix B: Rink &Fox's Product Life Cycle-Procurement Strategy Model[B]

PS# Purchasing Strategy

Introduction Stage

1 Evaluate custom shops and supply houses as possible vendors of materials not bought before or bought in small quantities

2 Urge Engineering to formulate new product specifications that will reduce future supply problems

3 Try to have new product design incorporate materials already in satisfactory use on existing products

4 Suggest in-house assembly of original designs to prevent disclosure to competitors

5 Anticipating materials requirements will change as the product's sales vary, insist on certain options in supply contracts (e.g., buyer's right to change specifications, etc.)

6 Obtain variety of sample materials for testing

7 Perform make-or-buy analysis for forthcoming product

8 Secure cooperation of vendors to supply small quantities of materials for trial orders, regardless of unit costs

9 Screen forthcoming product and materials for compliance with government regulations

10 Use life-cycle costing to evaluate proposals for buying equipment to produce forthcoming product

11 Assist in ascertaining whether to implement a Materials Requirement Planning (MRP) Programme

12 If hazardous materials are used, ensure firm has registered licenses/permits

13 Assist in financial planning for new product

14 Purchase variety of special parts, tailor-made components, etc.--each in small quantities

15 Develop list of preferred and standby sources based upon firm's experience with new vendors and their capacity to deliver during the expected sales growth

16 Work closely with suppliers to resolve materials defects

17 Be prepared to handle avalanche of product modifications from Engineering

18 Use subcontractors until product's market acceptance has been demonstrated

19 Monitor sales research reports for clues about eventual growth or discontinuance

20 Cooperate in developing preliminary standards for cost, quality, etc. for forthcoming product

21 When signals of imminent sales growth have been confirmed, plan an orderly shift from subcontractors to owned facilities

[A] Adapted from Rink & Fox (2012).

22 Consolidate small-quantity orders with other inbound shipments

23 Contact preferred vendors and begin establishing long-term relationships with them

24 Arrange for leases with options to buy equipment, facilities, etc.

25 Identify trends in materials and processing that will lead to new product designs

26 Participate in developing quality standards and specifications for materials

27 Determine short- and long-term supply and demand of major materials

28 Educate vendors concerning firm's specifications and quality standards

29 Ask suppliers to identify start-up and tooling costs

30 Prior to manufacturing custom-designed equipment, ask potential vendors to conduct a pre-purchase survey of firm's needs

31 Develop a list of prospective suppliers who can meet the firm's specifications and quality standards

32 Assist vendors in formulating and implementing quality assurance programs

33 Furnish tooling to vendors, if necessary

34 Together with Accounting and Receiving, establish policies and procedures for auditing and resolving vendors' invoices

35 Assist in establishing lead times, minimum stocks, and reorder points for new product

36 Help to formulate procedures to monitor quality of materials

37 Assess financial strength of new vendors

38 Balance high likelihood of failure of new product with urgency of acquiring adequate resources if it succeeds

39 Cooperate in determining whether to implement a Total Quality Management (TQM) program

Purchasing Strategy

40 Use Program Evaluation Review Technique (PERT) or similar tools to assemble all materials for producing the new product

41 Consult Marketing concerning sales expectations and market plans for new product

42 Solicit and evaluate quotations from vendors

43 Request and evaluate lead time estimates from suppliers

44 Consult Marketing concerning special orders and potential design changes

45 Work with IT to formulate a computerized communications system with suppliers to facilitate timely notification of changes, ensure vendors' inventory and production goals meet firm's needs, etc.

46 If the new product will replace an existing one, pare materials commitments to present vendors

47 Monitor progress of new product effort

48 Consider financing vendors' capital investment, because they may not be willing or able to risk their own resources on an unproven new product

49 Ensure vendors incorporate Engineering's requested changes in materials and parts

50 Consult with Traffic on carrier designation, routing, etc. for materials

51 Encourage suppliers to develop new technologies that can be incorporated into the firm's operations

52 Monitor customer feedback to pinpoint specific problems with new product

53 Work closely with suppliers, carriers, etc. to resolve customers' complaints

54 Cooperate in planning how firm will handle, store, and dispose of hazardous materials

55 Assist in developing a program for training workers in proper handling of hazardous materials

56 Prepare for changing government regulations based upon amount of hazardous materials handled

57 Select suppliers who are experienced and licensed to handle hazardous materials

58 Participate in determining whether to implement a Just-in-Time (JIT) Manufacturing program

59 Near the end of this stage, develop and implement a supplier certification program to improve materials quality, reduce inspection costs, etc.

Growth Stage

60 Selectively widen supply sources without disrupting desirable established relationships

61 Maintain strict quality standards on materials purchased despite pressure from departments for speedy deliveries

62 Build inventories of raw materials and goods-in-process

63 Expand staff to handle increase in volume of requisitions and requests for expediting vendors' shipments

64 Shift to large-volume suppliers

65 Phase out some subcontractors in favor of in-house production

66 Use brokers to find scarce items for immediate delivery

67 When concessions to suppliers are warranted to obtain materials quickly, ask Legal to ensure firm's rights are not waived for future occasions

68 Avoid over-buying when some function managers exaggerate this period's steep sales increase

69 Work with IT to make interchange between vendors and firm as well as among vendors more effective and efficient

70 Participate in revising lead times, minimum stocks, and reorder points

71 Urge Accounting to pay vendors' invoices promptly to help maintain flow of inbound shipments

72 Enlist Purchasing executives' high-level contacts at suppliers and transport firms to obtain needed materials quickly

73 Expedite vendors' shipments

74 Cooperate in installing Economic Order Quantities (EOQs)

75 Perform make-or-buy analysis for product

76 Conduct ABC inventory analysis on materials

77 To ensure long-term supply, determine whether to buy ownership interest in a key supplier or obtain control of a major material previously bought from a vendor

78 Use blanket purchase orders and traveling requisitions to minimize repetitive ordering

Purchasing Strategy

79 Participate in determining whether to expand existing manufacturing facilities

80 Evaluate departmental effectiveness and efficiency by reviewing/revising policies and procedures

81 Expand personnel to accommodate increase in filings of loss and damage claims as well as requests for tracing vendors' shipments

82 Near end of period, consult Marketing concerning product modifications, line extensions, etc.

Maturity Stage

83 Develop and maintain a suitable mix of geographically dispersed vendors

84 Cooperate in revising product standards and specifications

85 Urge Engineers to specify interchangeable parts in product modifications

86 Assist in determining whether to revise firm's MRP program

87 Participate in ascertaining whether to replace the firm's obsolete equipment or tooling

88 Encourage suppliers to propose simplifications of materials and other cost-saving ideas for the existing product

89 Try to shift inventories to suppliers

90 Press vendors for systematic price reductions based upon their experiences

91 Replace obsolete or worn-out tooling at vendors, if necessary

92 Pursue vendors' discounts

93 Insist vendors adhere to firm's quality standards for materials despite pressures for lower costs

94 Perform make-or-buy analyses for products with stable demand, new product extensions, etc.

95 Work with IT to find ways to improve the efficiency of information exchange between suppliers and the firm as well as among vendors

96 Cancel overdue purchase orders

97 Adjust input quality standards to conform to customers' buying criteria

98 Defend firm's rights in disputes with vendors

99 Give preference to vendors who also are customers

100 Improve negotiation techniques with suppliers to obtain lower prices

101 Stabilize materials commitments

102 Investigate feasibility of long-term contracts with fewer sources

103 Delegate routine purchasing to junior buyers

104 Develop internal suggestion system to solicit ideas for improving purchasing operations

105 Centralize some procurement at headquarters (e.g., national contracts)

106 If Production decentralizes its operations, consider splitting up buying assignments the same way

107 Evaluate usefulness of purchasing reports for its own internal control and informing top management of its operations

108 Evaluate efficiency of Purchasing by reviewing/revising its organisation, policies, procedures, etc.

109 Use new buying techniques (e.g., prepaid purchase orders) to reduce lead times or eliminate need to stock maintenance items

110 Monitor possible disruptions to supply continuity (e.g., strikes and plant closures)

111 As a precaution, regularly place materials orders with several alternative suppliers

112 Conduct systematic departmental cost-reduction efforts to increase efficiency (e.g., "paperless" purchasing)

113 Support efforts of shippers' associations to lower freight rates on incoming shipments

114 Work with Traffic to determine cost-reduction possibilities by consolidation of shipments and other arrangements with shippers (e.g., lower-cost freight class)

115 Investigate using trade associations as clearing-houses to sell excess materials or purchase needed materials

116 Collect and interpret information from different sources (e.g., trade shows) and forward findings to appropriate department heads and top management

117 Research substitute materials

118 Conduct Commodities Study to determine short- and long-run supply, demand, and prices of substitute materials

119 Along with Engineering, conduct value analyses and other broad-scope efficiency studies

Purchasing Strategy

120 Participate in performing a benchmark study of major competitors' products and processes to identify ways to improve the firm's existing product and operations

121 During value analysis, require prospective vendors to identify their start-up and tooling costs for manufacturing substitute materials

122 Perform price-cost analysis of vendors' inputs to ensure reasonableness of costs for producing substitute materials

123 Screen substitute materials (especially hazardous ones) and redesigned product for compliance with various government regulations

124 Make sure firm acquires proper licenses/permits for use of substitute materials that are hazardous

125 Participate in planning how firm will handle and dispose of substitute materials, especially hazardous ones

126 Ensure vendors have necessary equipment/facilities, expertise, permits, etc. for handling, storing, and disposing of substitute materials, especially hazardous ones

127 Explore importation of labor-intensive parts or acquisition of suppliers

128 Mandate value analyses reduce use of critical materials and shift as much as possible from use of non-replaceable to replaceable resources

129 Urge Engineers to discover creative ways to use recycled materials

130 Anticipate fractionating purchasing requirements due to the increase in product models, sizes, etc.

131 Cooperate in ascertaining whether to revise firm's TQM program

132 Participate in determining whether to revise firm's JIT manufacturing program

133 Investigate alternative sources of supply

134 Work with IT to develop and install an automatic, computerized system for reordering standard quantities of materials

Decline Stage

135 Enforce quality standards of input items even though competition for decreasing volume makes vendors desperate

136 Adjust EOQs to reflect decreasing demand

137 Assign cautious, controller-type Purchasing executive to screen requisitions and audit vendors' invoices for faltering product

138 As ordered materials may lack alternative uses, accurate sales and production forecasts are important

139 Revert to subcontracting if firm's equipment can be exported or converted to other new products

140 Investigate selling excess materials and inventories to branch plants and suppliers or through brokers and trade associations

141 Develop and implement plan for disposal of recycled/scrap materials, obsolete/surplus tooling/machinery, and hazardous materials

142 Transfer procurement specialists to other duties or newer products

143 Ensure adequate inventories of spare parts are maintained to serve users of the old product

144 If another firm is licensed to manufacture the old product, ask Legal to review and transfer purchasing commitments

145 As soon as arrangements for subcontracting are assured, notify existing suppliers and offer assistance (e.g., disposal of their inventories)

[A]Adapted from Rink and Fox (2012).