



AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search

<http://ageconsearch.umn.edu>

aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

Rewarding New Product Development Personnel: Are Confectionery Manufacturers Still in the Dark Ages?

Aslihan D. Spaulding
University of Kentucky
Post Doctoral Scholar
ademi0@uky.edu

&

Tim A. Woods
University of Kentucky
Associate Extension Professor
tawoods@uky.edu

**American Agricultural Economics Association-2002
2002 Annual Meeting, Jul7 28-31, 2002, Long Beach, California**

Copyright by Aslihan D. Spaulding and Tim A. Woods. All rights reserved. Readers may take verbatim copies of this document for non-commercial purposes by any means, provided that this copyright notice appears on all such copies.

Rewarding New Product Development Personnel: Are Confectionery Manufacturers Still in the Dark Ages?

Introduction

The importance of new products for a company's growth has been discussed extensively in the new product development literature (BAH, Cooper, Griffin). There are many factors which affect the success of a new product, such as product fit with market needs, involving consumers early in the development process, and timing of the new product's introduction. Team management and design is also important. Parallel processing and cross-functional teams create an environment for accelerated collaboration.

The new product development literature pays a lot of attention to determine what factors influence the success of a new product. Compensation of personnel involved with new product development, however, has received little attention. Kuczmarski (1992) notes that the most underdeveloped area of new product management is effective financial rewards and incentive and compensation practices (p.228). New product personnel are the key to development and introduction of a new product. Their actions have a strong impact on the success of the new product and, therefore, the growth and existence of the company.

In this paper, the new product personnel compensation practices of the North American confectionery manufacturers are explored. A survey on these manufacturers revealed that not much has changed since the early 1980s. Few manufacturers provide bonuses or compensation in addition to base salary to their employees specifically involved with new product development. However, the cross-functional team has become a norm, and new product performance is measured by many manufacturers. There is room for improvement in rewarding employees based on product and team performance. The impact of cross-functional team use

and compensation of new product personnel on new product development time will also be explored with a model of new product development time.

Background

Kuczmariski(1992) suggested that new product professionals need to be motivated and rewarding them based on the new product's performance is the key for motivation. Kuczmariski stated that "most U.S. corporations are living in dark ages in terms of motivating new product people through performance-based compensation and incentive systems"(p.228). Those companies who want to create a risk-taking, entrepreneurial environment need to stimulate new product development personnel, which may be done through financial and/or non-financial rewarding systems.

There are very few studies specifically focusing on rewards and compensations for new product development personnel. The first study mentioning rewarding systems in the new product development area was the Booz, Allen and Hamilton (1982) study of New Products Management for the 1980s. They did not find any standard compensation practices among the manufacturers sampled. They did find that 57% of the study participants tied compensation to general performance, while 38% used only base salary as a form of compensation. Only 5% tied compensation directly to new product performance.

Feldman's survey of Product Development Management Association (PDMA) members in 1991 reported compensation levels for new product professionals in different industries, but it did not have any information on the type of rewards they received when the new product performed well in the market.

Page (1993) analyzed the findings of the Best Practices Study (1990) conducted by PDMA. He found that 47% of the respondent's companies used straight salary as a

compensation plan, 51% of them used base salary plus a bonus and only 2% had both of the compensation plans in place. The bonuses were based on different factors, such as company profitability, individual performance, successful accomplishment of the new product project, and the new product's performance. New product performance was the main determinant of a bonus for only 7.4% of the 189 companies surveyed.

The Best Practices survey revealed that only 20.6% of the participants had incentives to motivate their new product personnel beyond the base salary.

Feldman (1996) examined the findings of a PDMA membership survey of 1994, which was conducted as a follow-up to the Best Practices survey in 1990. While in the 1980s the performance based financial rewarding was not very common, in the 1990s, companies started to adopt some form of performance based rewarding system within their new product development system. The most commonly used form of rewarding was a bonus, which was the only incentive beyond a base salary offered to 42% of the new product professionals who participated in the survey. Bonus plus profit sharing and bonus plus stock options were also used as an incentive to these professionals.

In addition to financial incentives, the survey also revealed information on non-financial awards. Plaques, certificates, and award dinners are the most commonly used forms of non-financial incentive among the study participants' companies.

In the 1990s, a new dilemma came up. Since using cross-functional teams was highly recommended in order to achieve a well performing new product, compensation of new product employees as members of the team became a topic of discussion in the literature. Song et al. (1997) hypothesized that internal facilitators, like reward procedures, impact the degree of cooperation between cross-functional team members. They showed in their study of high-tech

companies that the effect of cross-functional cooperation on new product performance was significant.

Should new product professionals be rewarded based on their individual performance, their team membership, or the new product's performance? According to Smith (1997), 'individuals should not be rewarded if team cooperation is the desired outcome' (p.52). Feldman found that only 70 (19%) of the study participants' financial incentive was tied to their team membership. Overall, the team's performance was the determinant of the level of incentive for only 56 out of 70 participants while seven participants' incentive was based on their contribution to the team.

Kohn (1999) showed that incentives may work in the short run, but it is a strategy that ultimately fails. He suggested that people do not do a good job when they are attracted with incentives and strategies that use rewards to change people's behavior, which are ineffective over the long run.

There are two general issues regarding the structure of compensation. One issue is team versus individual work. The second issue is measuring performance and tying compensation to the performance of the new product. It is also important to note that there is also a risk-reward tradeoff. If there is a push for innovation within the firm, then new product employees will be willing to take risks and they will be more creative in new product development activities. However, if there is a punishment for failure, then risk-taking behavior will not take place and, therefore, less innovation will be observed, which will limit new product activities. Miller (1992) suggested that motivation and compensation are not heavily linked for the new product professionals, and compensation is more likely to be perceived as a problem than as a reason to

do what new product professionals love to do (p.13). He also stated that motivation is best handled by creating an autonomous new product development team.

Survey of North American Confectionery Manufacturers

A survey of the North American Confectionery Manufacturing Industry examined the current practices of new product development teams and included a series of questions on incentive structures used for their employees.

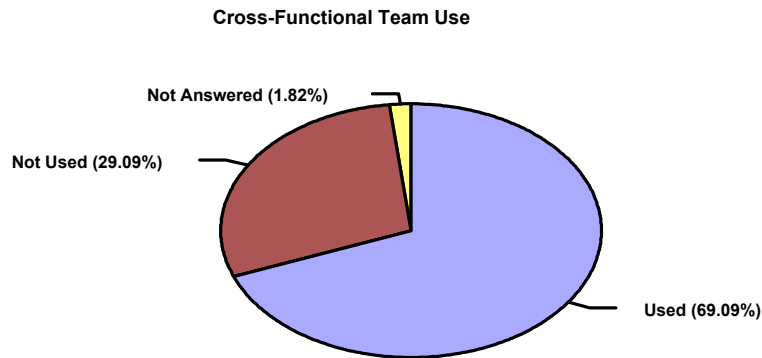
A mail survey was sent to 566 confectionery manufacturers located in the North American region, namely U.S. and Canada. There were 110 usable responses received which included information on 198 new products recently introduced. Questions on the type of the products, cross-functional team use, performance measurement, rewarding system, supply-chain management practices and general demographic information were included in the survey.

It is reasonable to expect that larger firms may structure their new product development process differently from smaller firms. Additionally, larger firms may structure their compensation differently. These differences were examined as a part of this analysis. Company size in the sample varied from very small, with one or two employees, to more than 10,000 employees. Annual sales levels also varied among respondents. Responses were split evenly between smaller companies (less than \$20 million in sales) and larger companies (more than \$20 million in sales). There were 50 small and 49 large manufacturers, while the size of 11 manufacturers could not be determined. Each responding manufacturers introduced 10 new products on average in 1999 and the majority of these products were modifications of existing company products. Large manufacturers introduced 15 new products on average while small manufacturers introduced only four new products in 1999.

Findings on Cross-Functional Teams, Performance Measures and Rewarding Systems

The New Product Development Practices Survey of Candy and Snack Manufacturers revealed that 76 out of 110 confectionery manufacturers used cross-functional teams in developing and reviewing new products (Exhibit 1). Cross-functional teams were used by 82% of the large manufacturers and 56% of the small manufacturers. Most of the survey participants also said that they found cross-functional teams helpful in developing new products.

Exhibit 1 Cross-Functional Team Use



New product success measures vary among confectionery manufacturers. Out of 110 manufacturers, five of them did not measure their new product's success and another five used only one measure (Exhibit 2).

Exhibit2 Number of Performance Measures Used

Number of Performance Measures	Number of Manufacturers Using Performance Measures	Percent
0	5	4.5
1	5	4.5
2	26	23.6
3	24	21.8
4	19	17.3
5	12	10.9
6	8	7.3
7	5	4.5
8	6	5.4

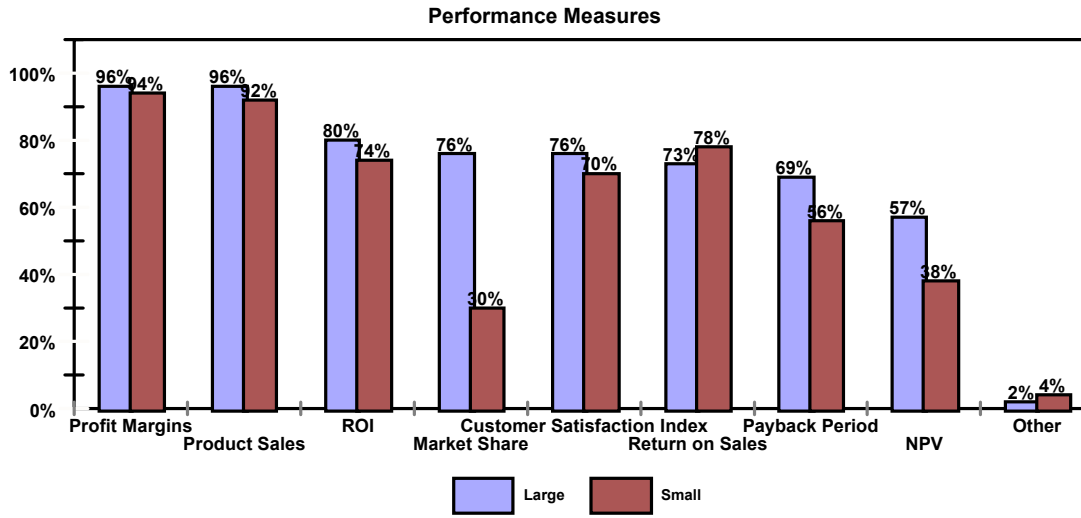
Measuring product performance can be a very difficult task and is certainly one of the barriers to tying compensation to outputs. The survey of confectionery manufacturers revealed that these firms use a wide range of performance measures and most of them use more than three different measures.

The larger firms tend to be more committed to measuring product performance, but, as will be noted later, not all new products are expected to perform equally and they play different roles in the firm's portfolio¹.

The most commonly used success measures for large manufacturers were profit margins, new product sales, and return on investment. Small manufacturers used profit margins, product sales and return on sales more for measuring performance (Exhibit 3).

¹ Peter Drucker (1986) argues for a balanced portfolio of products to be divided between near-term, low risk products and longer-term, higher risk, higher payoff products. Certainly this complicates the division of R&D labor and corresponding compensation even further.

Exhibit 3 Performance Measures and Company Size



The Booz, Allen, Hamilton (BAH, 1982) and the PDMA studies all revealed the same pattern such that return on investment and profit margin were the most commonly used success measures in 1980s and 1990s (Exhibit 4). Return on sales and the customer satisfaction index were also used by the majority of this study’s participants. Market share and net present value measures were not used by the majority of the small confectionery manufacturers. Net present value and payback period were the least used performance measures for the large manufacturers.

Exhibit 4 Performance Measures: Confectionery Manufacturers, BAH, PDMA

Performance Measure	Confectionery Manufacturers (percent)	BAH(1982) (percent)	PDMA (percent)
Profit Margin	93 (*)	80	21
Product Sales	93	72	21
ROI	77	72	23
Return on Sales	75	-	3
Customer Satisfaction Index	73	-	21
Payback Period	62	55	8.5
Market Share	51	-	5
Net Present Value	45	18	3

* the three most popular financial performance measures for each study are shown in bold characters.

The relationship between the product performance and compensation needs to be explored. New product development personnel may be awarded based on not only their performance but also product's performance. Evaluation factors like meeting time targets or meeting and exceeding revenue and profit goals, and achieving customer satisfaction can be used to determine the size of a bonus (Feldman (1996), Kunkel (1997)). The connection between the performance measures and the bonus plans must be made earlier in the process and it needs to be explained to the team in advance so that the team members would know what to expect in terms of rewarding their and new product's success. After all, the bonus plans are in place to ensure commitment, cross-functional teamwork and a successful rollout.

The confectionery manufacturers were also asked to identify their financial compensation plan for employees specifically involved in the new product development process. Results from this question showed a similar pattern to the Booz, Allen and Hamilton and PDMA studies with 52% of the participants indicating that their financial compensation plan included a straight salary while only 43% of the participants indicated that their financial compensation plan included base salary and a bonus. Only 36% of the small manufacturers offered bonuses in addition to base salary to their employees while 53% of the large manufacturers had a bonus plan.

The survey further examined if the compensation was tied to a new product's success. It also asked that if there was a compensation based on the new product's performance, what type of compensation could be expected. Only 41% of the respondents, 25 large and 17 small manufacturers, said that there is no direct compensation if the new product is a success. For the rest of the manufacturers who participated, a cash bonus (23%) and a salary raise (22%) were the types of compensation that an employee involved in the development of a successful new

product, could expect. Company awards (11%), profit share (10%), share of team bonus (8%) and promotion (6%) were other types of compensation expected by these employees. The top three compensation plans used by large manufacturers included cash bonuses, salary raises, and company awards. The small manufacturers utilized salary raises, cash bonuses, and profit shares the most as tools of compensation.

Motivation of a new product professional has several impacts on a company’s existence and its future in the marketplace. Motivated employees will be more likely to give more attention to the development and introduction of a new product. If this is the case, then the question arises: is the new product development time affected by new product professionals who are motivated by a reward depending on the new product’s success? The faster the development is, the earlier the product enters into the market and the company captures the first mover’s advantages like higher market share and brand recognition. The positive and significant relationship between speed of development and product success has been documented in the literature many times. The timing of the introductions is imperative in a highly competitive marketplace, therefore, how fast and efficient new product employees work has an impact on when a new product is introduced.

The distribution of 198 new products reported in this survey, based on product newness and average development time spent on each product type, is shown in Exhibit 5.

Exhibit 5 Product Type and Development Time

Product Type	Number Reported	Development Time (months)
Innovative	16	16.2
New to market new to company	35	9.1
New line to a company	35	7.8
New item in an existing product line	76	6.1
Modification of an existing company product	46	5.6

On average, confectionery manufacturers spent 7.5 months to develop a new product. They spent 16 months on innovative type products, while modifications took only 5.6 months. The newer the product is to the company or to market, the more time it takes to develop. Larger manufacturers spent 8.1 months on average to develop a new product whereas smaller manufacturers spent 6.8 months. This time difference is found statistically not significant. Therefore, we cannot say that small manufacturers are faster than large manufacturers in developing new products.

The question of whether compensation difference accelerates development time across different categories of product types can also be explored. For the innovative and new to market-new to company type products, there is a statistically significant difference in average product development time across manufacturers with and without bonus plans at 10% significance level. For the rest of the product types, no significant difference in development time is found. We can say that a bonus plan plays a role in accelerating development time for relatively newer, more innovative type of products.

Exhibit 6 shows number of new products introduced and average development time spent to develop new products by large and small manufacturers.

Exhibit 6 Product Type, Company Size and Development Time

Product Type	Large Manufacturers	Small Manufacturers
Innovative		
Number of Products	6	6
Average Development Time (months)	17.2	17.2
Standard Deviation	(6.7)	(26.9)
New to market new to company		
Number of Products	21	11
Average Development Time (months)	11	5.9
Standard Deviation	(7.6)	(6.3)
New line to a company		
Number of Products	18	9
Average Development Time (months)	7.2	7.2
Standard Deviation	(5.6)	(3.7)
New item in an existing product line		
Number of Products	29	33
Average Development Time (months)	6.8	6.0
Standard Deviation	(3.5)	(3.3)
Modification of an existing company product		
Number of Products	16	24
Average Development Time (months)	4.7	5.6
Standard Deviation	(2.6)	(3.5)

The t-tests showed that average development time is different across large and small manufacturers for only innovative type of products at 1% significance level. For other type of products, no statistically significant difference is found in development time.

Development Time and Compensation Strategy

If there is a difference, what is the relationship between providing a bonus to new product development professionals and development time?

Exhibit 7 New Product Development Time and Bonus Plan

BONUS	N	Mean Development Time	Std Dev
Not Provided	84	6.51	4.99
Provided	101	8.52	8.61

Products introduced by companies who did not provide a bonus to their new product personnel took 6.5 months on average to develop, whereas, products developed by companies

with bonus plans for their new product personnel took 8.5 months (Exhibit 7). This difference is found statistically significant which implies that companies with no bonus plan for their employees who are involved with the development of a successful new product take less time to develop the new product when compared to those with a compensation plan.

Now, we test the following hypothesis:

Ho: Variances are equal

Ha: Variances are not equal

Then we need to test the following hypothesis:

Ho: There is no difference in mean development time between companies who provide a bonus to new product personnel and companies who do not provide a bonus to new product personnel.

Ha: There is a difference in mean development time between companies who provide a bonus to new product personnel and companies who do not provide a bonus to new product personnel.

The t-test and equality of variance test results are shown in Exhibit 8.

Exhibit 8 T-Test for New Product Development Time and Bonus Plan

T-Tests				
Variable	Variances	DF	t Value	Pr > t
New Product Development TIME	Equal	183	-1.89	0.0600
New Product Development TIME	Unequal	165	-1.98	0.0492
Equality of Variances				
Variable	F Value	Pr > F		
New Product Development TIME	2.97	<.0001		

F-value is 2.97 and probability is less than 0.0001, which imply rejection of the first Ho and conclusion of variances are not equal. Based on this conclusion, we look at the t-values for the unequal variances. It is -1.98 and probability is less than 0.0492, which implies that the

second hypothesis is rejected at the 5% significance level. Therefore, we conclude that there is a difference in mean development time between the companies with a compensation plan and the ones with no compensation plan.

These are interesting findings. If an employee is expecting compensation based on new product's success, new product development takes more time. This is probably due to the fact that these employees' rewards are based on a new product's success and, therefore, they are not rushing anything. They are being cautious and are taking their time to develop the product so that it will enter the market with confidence. Their cautiousness may cause time expansion, which may in turn affect the success of the new product. Therefore, the tradeoff should be recognized where manufacturers and their employees have to be aware that a sensitive relationship between efficiency in time and compensation for new product personnel exists. While rewarding is an internal facilitator that fosters cross-functional cooperation, as suggested by Song and Parry (1997), it may be slowing down the development time. There is another possibility. Larger manufacturers are more likely to have a bonus system (as noted earlier), they take more time to roll out new products because they are more conservative and do new products on a large scale roll-out.

Conclusions

There is not much difference observed in the rewarding systems employed by confectionery manufacturers today from those employed by general manufacturers in the early 1980s. The new product development professionals are still having to deal with a risk-reward dilemma while teamwork is becoming a norm and compensation is rarely based on a product's success. Compensation design is made even more difficult by the complex task of measuring a product's performance and value to the firm.

Unfortunately, study participants were not asked if they were rewarded for being a team member or for team performance. There is also a need for more information on how and if teamwork is encouraged, is risk-taking behavior rewarded or is there a punishment in case of a failure.

The confectionery manufacturers need to find the balance between motivation of new product professionals with rewards and compensation based on a new product's success and development time. It is crucial that a product is developed and introduced not only fast, but also with an appropriate assessment of the risks and rewards. It is important that the new product personnel find an efficient way to develop and introduce products. At the same time, manufacturers need to find ways to motivate their new product personnel, which will enhance their motivation for introducing successful new products in a timely manner.

There are several questions that can be asked to these manufacturers in a future research. Does the manufacturer offer an incentive to teams to pull the plug on risky projects? How does this affect the development process and development time? Who is in the team and who is not? Are the bonus systems better? Is Kohn's point of punishment by rewards valid for these manufacturers in the long run? More research needs to be done in exploring the relationship between the compensation systems and product performance.

As a conclusion, we can say that the confectionery manufacturers are still in the dark ages in terms of their rewarding and compensation systems. However, there is room for improvement. First, they need to make their organizational strategy clear and well defined. If team membership is encouraged, and innovation is sought, then risk-taking behavior must be encouraged and not be punished. Second, manufacturers have to measure a new product's performance. It may not only affect compensation levels, but it also has an impact on the

manufacturer's future in the marketplace. Finally, how the compensation and rewarding system works must be explained to the new product development personnel such that rewarding can be based on a team's success, individual's performance and contribution to the team, new product's success or any combination of the three. Whatever criteria are used, these have to be communicated to the new product professionals so that there will not be any confusion and disappointments in the end.

Bibliography

- Booz, Allen and Hamilton (1969), "Management of New Products", Booz, Allen and Hamilton Management Consultants.
- Booz, Allen and Hamilton (1982), "New Products Management for the 1980s", Booz, Allen and Hamilton Management Consultants.
- Cooper, Robert G., (1979), "The Dimensions of Industrial New Product Success and Failure", Journal of Marketing, Summer 1979, vol.43, pp.93-103.
- Drucker, Peter F., (1986), Managing for Results, Harper and Row, NY, NY.
- Feldman, Laurence P., (1991), "A Profile of the New Product Professional", Journal of Product Innovation Management, 1991, vol.8, pp.252-266.
- Feldman, Laurence P., (1996), "The Role of Salary and Incentives in the New Product Function", Journal of Product Innovation Management, 1996, vol.1, pp.216-228.
- Feldman, Laurence P. and Albert L. Page, (1984), "Principles vs. Practice in New Product Planning", Journal of Product Innovation Management, 1984, vol.1, pp.43-55.
- Griffin, Abbie, (1997), "PDMA Research on New Product Development Practices: Updating Trends and Benchmarking Best Practices", Journal of Product Innovation Management, 1997, vol.14, pp.429-458.

- Griffin, Abbie, and PDMA, (1997), “Drivers of NPD Success: The 1997 PDMA Report”, Product Development Management Association, Booklet.
- Griffin, Abbie, (1997), “The Effect of Project and Process Characteristics on Product Development Cycle Time”, Journal of Marketing Research, February 1997, vol.34, pp.24-35.
- Kohn, Alfie, (1999), Punished by Rewards: The Trouble with Gold Stars, Incentive Plans, A’s, Praise, and Other Bribes, Boston: Houghton Mifflin.
- Kuczarski, Thomas D., (1992), Managing New Products: The Power of Innovation, Second Edition, Englewood Cliffs, New Jersey: Prentice Hall.
- Kuczarski, Thomas D., (2000), “K&A Study: Winning New Product and Service Practices: Six Keys That Will Unlock Innovation Success”, Innovation Mindset, Kuczarski & Associates, pp.2-9.
- Kunkel, J. Gregory, (1997), “Rewarding Product Development Success”, Research Technology Development, September-October 1997, vol. 40, issue 5, p.29-31.
- Miller, Christopher W., (1992), “Motivating the Troops: The Role of Compensation in the Product Development Process”, Visions, vol.16, no.2, Product Development Management Association, pp.8-13.
- Page, Albert L. (1993), “Assessing New Product Development Practices and Performance: Establishing Crucial Norms”, Journal of Product Innovation Management, 1993, vol.10, pp.273-290.
- Smith, Preston G. (1997), “Cross-Functional Design Teams”, ASM Handbook, Materials Selection and Design, vol.20, pp/49-53.

Song, X. Michael, Mitzi M. Montoya-Weiss, Jeffery B. Schmidt (1997), “Antecedents and Consequences of Cross-Functional Cooperation: A Comparison of R&D, Manufacturing, and Marketing Perspectives” *Journal of Product Innovation Management*, vol. 14, pp.35-47.

Song, X. Michael and Mark E. Parry,(1997), “A Cross-National Comparative Study of New Product Development Processes: Japan and the United States”, *Journal of Marketing*, April 1997, vol.61, no.2, pp.1-18.