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# As the PMI Turns: A Tool For the Supply Chain Manager

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# ALASKAN PURCHASER

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## AS THE PMI TURNS: A TOOL FOR THE SUPPLY CHAIN MANAGER

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### SUMMARY

Supply chain managers use the PMI, an index of business activity and proxy for the general business cycle, to obtain valuable information important to strategic managerial planning. This research explores a methodology to provide managerial insight into the general business cycle by tracking and forecasting cycle turns in the PMI. A regression model is developed based on inherent cycles in the PMI between 12 and 65 months to forecast turning points for the index and anticipate changes in the business cycle, which is superior to the more commonly used Box-Jenkins forecasting technique. Strategic planning using this knowledge allows management to optimally adjust long-term levels of production, inventory, employment and orders as necessary. (CONTINUED NEXT COLUMN)

The PMI, formerly the Purchasing Managers' Index, is described on [www.ism.ws](http://www.ism.ws), the home page of the Institute for Supply Management™ (ISM). According to this Web site, the PMI has earned immense recognition from economists and forecasters because of the report's early and accurate portrayal of the health of the manufacturing sector of the economy. Studies have concluded that the PMI can be a useful forecasting tool in understanding changes in U.S. economic activity and should be considered in making optimal strategic decisions (Kauffman 1999). Traditionally, supply chain managers have tended to rely substantially on judgment and manually calculated forecasts and less on sophisticated computer-generated forecasts (Wisner and Stanley 1994). The PMI is one of many decision aids available to supply chain managers in developing long- and short-range managerial plans.

The PMI results from a survey of business professionals and is positively correlated with the gross domestic product (Klein and Moore 1988; Pelaez 2003). Öller (1990) suggested that surveys of business professionals provide anticipative judgments that offer clues pertaining to changes in business cycles from expansion to contraction or vice versa. Westlund (1993) described several issues and methods related to forecasting business cycles, which often focus on when a cycle changes directions. Business cycles have macroeconomic implications for supply chain managers with guidance being provided by forecasting tools and statistical summary data (Öller 1990; Westlund 1993). (Continued on page 2)

## Pro-D Dinner Meeting

**TIME: 5:30 p.m. Networking / 6:00 p.m. Program**  
Cost \$25.00\* Including Dinner, \$15.00 Without Dinner  
**VISA and MasterCard Accepted—No-Shows Billed**

\*Meal costs are subsidized by NAPM-Alaska as an additional benefit and as an incentive to attend monthly meetings.

**Location: Hilton Anchorage, 500 W 3rd Avenue**

### RESERVATIONS REQUIRED

Contact Pam Chenier at 742-8637 or e-mail  
[chenier\\_pam@asdk12.org](mailto:chenier_pam@asdk12.org) by noon on  
Tuesday, January 31, 2006

### FEBRUARY'S MEETING

**Thursday, February 2, 2006**

**Topic: Economic Forecast for Alaska**

**Speaker: Mr. Neil Fried**

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Since the PMI is a composite of diffusion indexes, the relevance of a diffusion index must be understood. A diffusion index is created by surveying business professionals to determine whether responses to questions are positive, negative or neutral. If 100 business professionals were asked "What is the trend for new orders?" and 60 responded positively while 40 responded negatively, then the diffusion index would be 60 percent. However, instead of 40 negative responses, suppose there were 30 negatives and 10 neutral responses. Then the 60 percent figure could be adjusted by adding half of the neutral responses. Hence, in this case the diffusion index would be  $60\% + 5\% = 65\%$ .

Thus, a diffusion index is created by adding the number of positive responses to one-half of the responses reporting no change, which generally represents the percent of components that increased during the month (Getz and Ulmer 1990). This number, which varies between zero and 100, is then seasonally adjusted. Another way of computing a diffusion index is to consider the change in positive responses over negative responses and use the following formula (Raedels 1990):

$$\text{Diffusion Index} = 50\% + 0.5(\text{change positive over negative percentages})$$

In the previous example with 60 percent positive, 30 percent negative and 10 percent neutral responses, the diffusion index would be  $50\% + 0.5(60 - 30) = 65\%$ .

A diffusion index has great appeal. First, it can be quickly tabulated and professionals do not have to quantify their remarks. A diffusion index is a measure of the dispersion of change and provides insight into the breadth of change in an area (Getz and Ulmer 1990). Diffusion indexes require little revision and are considered economic barometers (Dasgupta and Lahiri 1993). In the early 1980s, the U.S. Department of Commerce created a composite index of five diffusion indexes to reflect a maximum relationship between the manufacturing sector and the gross domestic product. Thus, the PMI was created and was given a weighting of 30 percent for New Orders, 25 percent for Production, 20 percent for Employment, 15 percent for Supplier Deliveries and 10 percent for Inventories (Pelaez 2003).

The PMI was back-calculated for years prior to the 1980s and is available starting in 1948. ISM's *Report On Business*<sup>®</sup> ([www.ism.ws/ISMReport](http://www.ism.ws/ISMReport)) contains nine manufacturing sub-indices that are computed from the results of a national survey of purchasing managers, and the PMI is a composite of five of these sub-indices. In addition, the *ISM Report On Business*<sup>®</sup> reports information on backlog of orders, new export orders, imports and prices. Survey participants represent some 400 industrial companies, reflecting diverse sectors of the economy. For a summary of the qualities of the PMI and its relationship to economic activity, refer to Kauffman (1999). For example, the PMI has a strong relationship with changing economic activity including turning points. Previous research reveals that it often lags changes in the gross domestic product.

(Continued next column)

This article proposes a methodology for predicting cycle turns for the PMI and compares it to the more commonly used Box-Jenkins forecasting technique. While the Box-Jenkins method is superior at forecasting the value of the next one or two months, the proposed methodology is superior at forecasting cycle turns of the PMI well into the future. Using a model based on the spectral analysis of the PMI, important information for basing strategic plans can be determined with accuracy in excess of 60 percent. Interestingly, the forecasts of turning points are either on time or early 92 percent of the time. This makes the forecasts a valuable tool in planning. Although the forecast PMI value for the next month is of interest to some, this knowledge provides relatively short-term information about the current business cycle. The proposed methodology enhances the usefulness of the PMI by providing insight about possible future expansions or contractions across a longer time horizon. This information could potentially make strategic decisions more effective, thus improving overall organizational performance.

Supply chain managers and business policy executives can use the proposed forecast turning points in the PMI in a variety of ways. Traditionally, profit-seeking firms are more inclined to use forecasts related to activity in the supply chain. By periodically monitoring forecast turning points, supply chain managers will not be surprised by high or low inventory, production or employment levels or with a sudden trend in placing or canceling new orders. With increased emphasis on cost reduction, supply chain managers may have to rely more heavily on forecasts to negotiate long-term contractual arrangements and perhaps even buying and hedging practices. Corporate policymakers who take a long-term view of the company can use the forecast of the PMI's turning points as a planning tool in providing long-term strategic guidance. The methodology presented in this study gives a company another advantage in obtaining a competitive edge in planning.

Limitations to the proposed forecasting methodology include the need to update the model periodically, cycles changing without notice, the forecast being much earlier than expected, and the lack of information on the strength of the next upturn or downturn. Supply chain managers must be able to implement the proposed procedure by using specialized statistical software. Business cycles are not all equivalent. Supply chain managers need to be able to evaluate the business environment using multiple sources of information. The regression cycle forecast is only one tool, albeit a very insightful one. No one forecasting tool will always accurately predict the timing of business cycles.

Future research related to the PMI should explore the use of combining judgmental forecasts with the quantitative forecasting of the PMI. Combining the forecasts of the regression cycle model with other forecasts, including judgmental forecasts, could provide a more accurate model. Supply chain managers should never rely on one index or forecast.