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Researching Sales Forecasting Practice

Commentaries and authors' response on "Conducting a Sales Forecasting Audit" by M.A. Moon, J.T. Mentzer & C.D. Smith

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Abstract

Sales forecasting is a common activity in most companies affecting operations, marketing and planning. Little is known about its practice. Mentzer and his colleagues have developed a research programme over twenty years aimed at rectifying the gap in knowledge. Most recently, in the Mentzer et al. (2002) paper they have demonstrated with supporting evidence the use of a sales forecasting audit to establish the dimensions of best practice. In this commentary on the paper, the methodology underlying their approach is examined from a number of different perspectives. The commentaries examine how convincing and complete has been the choice of audit dimensions as well as how this new research fits with evidence from other sources. Both commentators and respondents agree that the topic is important to organisational practice and more research is needed to gain a complete picture of the sales forecasting function and the systems that support it. Clarifying the audit function is particularly important since sales forecasting often has a low organisational profile until events turn sour with damaging consequences to organisational viability.

Keywords: Forecasting practice; Audit; Forecasting management; Performance measurement: Forecasting systems; Supply chain; Research methodology; Forecasting support systems

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Introduction - Robert Fildes

Any visit to a company that relies on sales forecasting in its operations or marketing confirms that the most important aspect of forecasting for those with organisational forecasting responsibilities is not simply the choice of approach but something much more fundamental - how the forecasting activities, the information system and the people who produce and use forecasts inter-relate. Increasingly I and other researchers have seen the gap between theory and practice in forecasting as an outcome primarily of organisational complexities and priorities (Mahmoud et al., 1992) rather than a stubborn refusal of practitioners to recognise the superiority of the latest methods found in the forecasting literature. It was with considerable enthusiasm that I received the article submitted by Mark Moon, Tom Mentzer, and Carlo Smith on "Conducting a Sales Forecasting Audit"- it was a rare contribution towards understanding just what goes right and wrong in the sales forecasting function. Because it explored new ground in forecasting research (although others had visited particular questions earlier) I thought its influence on both forecasting practice and forecasting researchers would be more substantial if some key aspects of the argument were held up to the light and picked apart. I therefore asked the referees of the article and other researchers who have argued for the importance of behavioural research in forecasting to comment on the assumptions and methods used by Moon, Mentzer and Smith, in particular highlighting areas where future research should prove most productive. What follows are comments by Stuart Bretschneider, Fred Collopy, Michael Lawrence, Doug Stewart and Heidi Winklhofer together with a response from the authors themselves. I and the editors of the journal would welcome further research contributions that examine how organisations go about the task of improving the forecasting function.

Robert Fildes, Associate Editor and President, *International Institute of Forecasters*

Problems in developing valid models to explain forecasting practice - Stuart Bretschneider

I have long supported the need for more and better work in forecasting that considers the role of organizational arrangements on forecasting practices and performance. Unfortunately, this paper, which does focus some attention on these issues, falls short. At the 2001 International Symposium on Forecasting in Atlanta, I chaired a session on why we spend so much research effort on forecast methods and so little on organizational arrangements. While many useful observations were made, I believe that there are three major reasons for the lack of attention to organizations-lack of appropriate research training, lack of appropriate data, and lack of appropriate incentives. While other presenters on the panel posited additional points I will focus only on these three.

The first point is that most researchers in the field are not adequately trained to do organizational research. If you look at the make up of researchers who publish in IJF and JoF, they are predominantly statisticians, econometricians, operations researchers and individuals who are heavily oriented towards methods and techniques. While many of these skills are useful in studying organizational arrangements, the key focus for this type of work is on questions of cause and effect that derive from fields like sociology, social psychology and political science. The emphasis is on complex multiple causal forms of explanation, not a unitary cause such as the forecast model or estimation technique. Another important distinction, and one I will return to later, is that this perspective is more about explanation than prescription, typically because, I would argue, you can't prescribe effectively without understanding of cause and effect first. How can research recommend an action without at least implicitly suggesting that the action links to a desired outcome-cause and effect. To illustrate this point let me recount a brief exchange I had with a prestigious forecasting researcher during the last symposium. He argued that theory was what statisticians study and produce, not what organizational sociologists study and produce. Unfortunately this view is flawed on many levels. Studying the properties of estimators is not strictly science in that it is more about building tools for the study of empirical phenomena than the study of the phenomena itself. This is tantamount to raising the physics lab technician, who builds equipment used in experiments, to the level of the theoretical physicist who posit cause and effect theories.

In forecasting our problem is letting people who propose a new method *de jour (e.g.* neural networks) who are essentially tool builders, define and control our research agendas instead of people who are asking questions like, "Does the nature of communication between functional divisions about forecasts (i.e. finance, marketing, production) effect the number of units who commit resources to forecasting, and how those forecasts are utilized in decision making?" In fact even today, despite almost 20 years of comparative studies, IJF still publishes what are essentially "demonstrations" and case studies or papers that illustrate some new techniques on one or two time series or with limited or no comparisons to other methods (Tkacz, 2001, Grubb and Mason, 2001, Fukuda and Onodera, 2001).

Assume the IIF suddenly had a large influx of organizational sociologists or current members began to shift their focus towards organizational elements. We would still face several major roadblocks towards implementing a research agenda. While we might be able to theorize on limited observation, any attempts to formally test or at least validate our theories, requires data on organizations and their functions. There are two problems we face here, first measurement and second access. Organizational sciences have struggled with measurement of complex organizational concepts for years, including constructs for formalization, structure, complexity etc. We are advantaged by that work and do not have to reinvent the wheel, though some concepts continue to be only poorly measured. We actually have a major measurement advantage over traditional work in organizational sciences since we actually have a reasonably well-defined set of performance measures to start from, forecast performance. The more difficult issue is access to organizations for the purpose of measurement. The best work in this area to date is the work by Lawrence and O'Connor (2000) and their colleagues who have done detailed interview and casework in multiple business organizations and work on government organization forecasting based on mail surveys or organizational data (Jones, Bretschneider and Gorr, 1997; Deschamps, 2001). It is difficult and expensive to generate this type of data, hence it is not surprising to see so much work that utilizes one or two time series, case studies and simulated data.

The final problem is the problem of incentives. Forecasting is an applied field, where there exists a need in real organizations to know how to improve forecast performance. We typically see this as an advantage but it does produce some drawback and in this context some questionable incentives. First, if a researcher believes they have developed a method that works better than existing practice the incentive is not to publish full disclosure of the technique but rather to obfuscate. A corollary to this is that when one publishes potentially marketable work there is an expectation that potential customers may be reading the paper and that advertising and promotional concerns are part of the presentation. The fact of the matter is that the demand for useful knowledge on forecasting will always outstrip our research capacity, especially the more careful and deliberative efforts.

Now let me turn to the paper, "Conducting A Sales Forecasting Audit." The virtue of this paper is that it goes beyond the question of technique and focuses our attention on organizational structures and processes. It also works from data drawn from a number of real organizations. While this represents a good starting point, the author present a series of criteria they argue relate to successful forecasting in organizations. Unfortunately, there is no clearly articulated notion of what that success is nor is there much in the way of how the suggested actions link to successful outcomes. The stated goals of the paper read more like a consultants report or an advertisement; to understand current practice, visualize the goal organizations should strive for, and develop a road map for how to achieve their goal. Don't misunderstand my point, I am not arguing that the audit being proposed is not potentially useful, or that the authors' arguments about a preferred state of the work is wrong. Rather I am arguing that from a research point of view there is no well-articulated causal mechanism that relates proposed action to outcome. Further, once such mechanisms are presented it is necessary to formally and empirically test and support them. To my mind this separates the consultant from the researcher.

For example, the discussion on functional integration simply states that more integration is somehow better than less. Why'? What behaviors would such a process evoke and would it happen on its own or are other elements of the system necessary? Reading between the lines, one might argue that increasing

functional integration increases communication, but does that lead to more cooperation or less? I might argue that certain rules and procedures would be necessary in order to prevent increased competition, the potential for grid-lock or end-runs etc. There are a lot of useful models in political science that might be relevant to this process. Also from the perspective of empirical evidence, the authors do not discuss any outcome measures or how to relate the processes variables being advocated to outcomes. For example, do the companies in stage four have better forecasting outcomes? If so, are these differences statistically significant and can the authors rule out alternative explanations for the finding (e.g. resources devoted to forecasting, organizational size, etc.)

The review of prior research in the paper presents a history of papers that make numerous prescriptive claims. The field is and should be interested in prescription. We are an applied research field, but theory must precede action and explanation before prescription. The role of science here is to build and verify as much as possible our prescriptive statements. Unfortunately this paper continues in the tradition of making prescriptions based on simple observations, common sense and intuition, all admirable and appropriate for consultants, real world managers, and the beginnings of a research process but not where we need to end up.

Stuart Bretschneider, Director, *Center,/or Technology and Infbrntation Policy,* Syracuse University

Where do the forecasting auditor's questions come from? - Fred Collopy

The question raised by audits of the sort proposed here is this. Where do the "predetermined standards" come from? The obvious answers are either generally accepted practices or best practices. The most generally accepted forecasting practice is probably one I heard about in a large organization when I was first researching how forecasts were made, the WAG. That was used, I eventually learned, to describe guesses. Using the acronym as your guide you can probably characterize what kind of guesses they were.

The alternative to generally accepted practices is to base the standards on some kind of "best practices". But, how can we know what best practices are? Given the widespread enthusiasm for benchmarking around best practices, it seems surprisingly difficult to recognize them..Are best practices those activities engaged in by the leading companies in an industry? How are such leaders identified? Are all of the activities of those leaders best practices? Or are only those activities that the company has identified as worthy of particular attention and investment?

In their 1982 book *In Search of Excellence,* Tom Peters and Robert Waterman summarized the lessons that could be learned from 36 of "America's best-run companies." They identified eight factors or practices that characterized these companies, including a bias for action, closeness to the customer, entrepreneurship, achieving productivity through people, a hands-on and value-driven style, sticking to the knitting, maintaining a lean staff, and the simultaneous presence of loose and tight properties. In his book *Forecasting, Planning, and Strategy for the 21 " Century,* Makridakis (1990) noted that of these 36 companies only seven appeared in a 1987 Business Week study of the top 46 companies in America. Of the top ten companies on Fortune's survey of most admired companies that same year, six did not even appear on Peters and Waterman's list. Their favorite company, IBM, was listed in thirty-second place by Fortune's editors. Wang Labs, another favorite, was at the bottom of Fortune's 300 companies. Makridakis leaves us with the question "If the vast majority of the excellent companies from before 1980 did not manage to meet that definition less than ten years later, can they really offer lessons on excellence to others (Makridakis, 1990, p. 7)?"

What is the alternative to using generally accepted practices or best practices as the basis for a forecasting audit? I think one answer is to rely upon empirical research and reflective generalization on the results found therein. One of the strengths of the Armstrong (1987) forecasting audit is its use of empirical research to identify common pitfalls in forecasting. Similarly, Pant and Starbuck (1990) provide rules, such as "simplify in ways that filter out random noise", "compare every forecast with no change," and "do not rely upon a single forecasting model," that could usefully inform a forecasting audit.

The authors argue that research in forecasting has focused on how to develop appropriate forecasting methods, leaving gaps in our understanding of "the behavioral factors associated with the management of forecasting in organizations (p. 3)." Setting aside for the moment the excellent work on these issues of such researchers as Sniezek (1989), O'Connor (1989) and Bretschneider and Gorr (1991) the question arises ... why? I would submit that the answer lies in the kind of results that forecasting research has produced over the past two decades. These results have had the effect of making many of us skeptical about the persistence of "trends", resistant to purely theoretical argument (think ARIMA modeling), and comfortable with simplicity. Research on organizations tends to be trendy, theoretical, and complex. Is it any wonder that we are reluctant to accept its prescriptions about how forecasting should integrate with other business functions? Is it surprising that most of us answer the question "should forecasting be done top-down or bottom-up?" with the question "which works?" The evidence is mixed.

Should forecasting exist as a separate functional area? I don't know. A more interesting question would be "Under what conditions should forecasting exist as a separate functional area?" And I certainly don't know the answer to that question. So what standards should be applied'? It would seem until there is evidence that one approach works better than another under particular conditions, we are best served by having a variety of behaviors. Using an audit to enforce one or another arbitrary practice has the potential to multiply the damage of a single bad decision.

Are forecasters who have been trained in statistics likely to produce better forecasts than those who lack such training? It's not clear. If such training results in the application of complex methods to uncertain time-series, it is likely to have a deleterious impact on forecasting accuracy. To be useful, an audit would have to ask more focused questions than "is the forecaster trained in statistics?" Questions such as, are the forecasters aware of the principal empirical results concerning forecasting accuracy? Do they apply them to their forecasting processes?

To the extent that the study proposes particular questions to serve as a basis for general forecasting audits, I think it comes up short, for reasons suggested above. But, to the extent that it encourages us to "focus some future forecasting research less on methods and more on management practice," it succeeds by raising some important questions. Answering them is likely to be most productive if we apply the lessons learned in studying forecasting methods, consider conditions, rely upon empirical investigations, examine competing models and explanations, and keep things simple.

Fred Collopy, Weatherhead School of Management, Case Western Reserve University

The importance of getting the forecast evaluation framework right - Michael Lawrence

The paper identifies the reported lack of progress in sales forecasting sophistication and performance (e.g. Mentzer and Kahn, 1995) with a lack of research attention to the implementation and management of forecasting within the organisation. As a step in correcting this deficiency, this paper describes "a methodology for conducting a sales forecasting audit" and the experience of applying this methodology to sixteen companies. This is a most useful addition to the literature and is likely to be widely read, quoted and used by organisations seeking to improve their forecasting procedures.

The core of the methodology derives from Mentzer, Bienstock and Kahn (1999) who developed a forecast evaluation framework containing four dimensions: Functional Integration, Approach (broadly equivalent to forecasting methods used), Systems and Performance Measurement. Within each of these dimensions they postulated 4 stages (or levels) of development. (I call this the MBK framework.) Each stage is characterised by a number of bullet points to designate the typical features of that stage. For instance Stage 3 of Forecast Integration has characteristics including: existence of a forecasting champion, recognition that marketing is a capacity unconstrained forecast while production is a capacity constrained forecast, and performance rewards for improved forecasting accuracy. The methodology gathers information, via interviews, in order to position the organisation within one (or possibly

more) stages on each dimension of the framework. Following this analysis to determine the current stage of the organisation's forecasting activity, an action plan is developed to advance the organisation from its current stage up to a higher stage.

The critical element in this research is the validity of the MBK framework. There is no point in designing an action plan to move an organisation up the stages on each dimension in the MBK framework if there is no assurance that a higher stage will lead to better forecasting. I am not sure that the low or high stages of the audit dimensions are necessarily generally associated with poor and inaccurate forecasts. Is there any research demonstrating that organisations operating at early stages in the forecasting framework do in fact produce poor or inaccurate forecasts? I have been involved in reviewing forecasting in a number of organisations who appear to be at about the same stage in the MBK framework. In some of these organisations the forecasts were excellent while in others they were truly awful - so biased and inefficient that they were significantly less accurate than a naive forecast (Lawrence, O'Connor and Edmundson, 2000). While the characteristics of the stages in the MBK framework appear reasonable, it is not clear which are the really critical ones, where critical is defined in terms of impact on forecast accuracy and organisational performance.

In addition there is generally so much clutter in large organisations that fixing the organisation at any one characteristic within one stage is almost impossible, particularly if one does not identify and carefully define the critical elements of a stage. For example, there may be a forecast champion (Functional Integration, Stage 3) but he does a poor job for any number of reasons, while in another organisation there is no designated forecast champion but the organisational culture is such that many employees as a normal part of their job understand and champion the need to develop good forecasts. Other characteristics are so imprecisely defined that assessing an organisation against the characteristic must be next to impossible. The reliability of data collected under these circumstances must surely be subject to question. Consider, for example, the first bullet point characteristic in Stage 3 of the Functional Integration dimension: "Communication and co-ordination between marketing, finance, sales, production, logistics and forecasting." This is so vague that every organisation or no organisation satisfies. All companies have some level of communication between these units but in most, the level is not as good as it might be. What distinguishes between a satisfactory and- an unsatisfactory level of communication? When we look down at Stage 4 we see that the communication and co-ordination issue has become "Functional integration between marketing, finance, production, logistics and forecasting". I would argue that one could have functional integration but still ineffective communication: these are somewhat distinct dimensions.

It seems that much more can be mined from the data gathered in the course of the research. I would like to read about such issues as: "how good were the forecasts; what factors impeded the integration of the forecasts; what distinguished between good and less good companies as far as forecasting was concerned; why had one company implemented and then not used a forecasting system"? In short I would have liked to learn something about the practice of forecasting and the relationship between this practice and the organisation. With 14 companies interviewed, a rich source of data was obtained to give valuable insights into many `between company' differences.

Thus in summary, while I agree that much good work can he done with the MBK framework, I would be concerned about reading too much into the stages and treating them as a definitive identification of the forecasting effectiveness of an organisation. The stages should be taken, I believe, as a fairly coarse grid to sift the vast mass of data uncovered during the interview activity and aid in making sense of it. One should be reluctant to use it to plot a path for forecast improvement without better evidence of its correlation with forecast performance. However it may very usefully show a general direction foreward. There are many examples of frameworks that have successfully played a role in assisting understanding of a difficult area although later research has showed them to be not generally true. The Gibson and Nolan stages of growth is a well known example (Gibson and Nolan, 1974). The MBK framework could well form the basis of much interesting research including:

- Firming up the definitions of the characteristics of the stages to ensure high inter-rater correlations.

- Identifying the impact of focussing the forecasting study at a department versus the whole organisation.
- Determining the fit between the MBK stages and other measures of forecasting excellence.

Michael Lawrence, School of Information Systems, Technology and Management, University of New South Wales

Conducting a Sales Forecasting Audit: Influence of Reward Structures - Doug Stewart

The approach described in the article "Conducting a Sales Forecasting Audit" offers substantial potential benefits, as illustrated by the examples in the article of companies that successfully implemented the 'way-forward' recommendations. Further improvements may be achieved by extending the approach to consider the relationship of reward systems to the forecast process. Furthermore, an explicit consideration of this relationship may result in more companies implementing the article's approach, which is an area of difficulty that was noted. The following commentary is based on research into sales forecasts (Stewart, 2001) but much of it can he generalised to other types of forecasts.

Reward Structure Bias

Many companies reward employees for performance against forecast (or more precisely, targets which are derived from forecasts), using an asymmetric system where exceeding the forecast results in positive rewards whereas falling short results in a mixture of punishments and withholding of rewards. Such systems are typically most visible for sales staff, but are also present in more subtle forms (both intentional and unintentional) for other functions, often resulting in a preference for pessimistic forecasts.

Such reward structures create two artificial linkages of Forecasts to Budgets and Targets. Rather than basing forecasts on empirical data, there is pressure during the early stages of the fiscal cycle to submit forecasts that will gain favourable budgets and targets. Some individuals may favour a low forecast (increasing bonus payments) whereas others may favour a high forecast (supporting funding and resource requests). During the later stages of the fiscal cycle, there is another set of pressures to adjust forecasts to match established targets and budgets, again rather than basing them on available data. Symptoms of these issues are employees using these three terms (forecast, target, budget) interchangeably without an understanding of their differences, and the use of the term `forecast error' being applied mainly or entirely when the direction of divergence is in the direction considered unfavourable (for sales, normally lower).

The pressures and motivations arising from such reward systems can affect all three stages described in the article. Employees under the influence of such reward systems may not be completely forthcoming with information during the "as-is" audit stage or may even deliberately provide misinformation. Furthermore, if they perceive a possible risk to their total reward package, they may be apathetic or actively opposed to the activities in the "should-be" and "way-forward" stages. Such passive and active resistance needs to be allowed for in the model, not only to protect the validity of the data collection and recommendations, but also to identify and address associated obstacles to implementation of the recommendations.

In addition to resistance resulting from reward systems, allowances also need to be made for misunderstandings resulting from the reward systems in general and confusion of terminology in particular. Surveys and interviews need to take into account that respondent's understanding of terms such as `forecast error', `budget', `target' and 'forecast' are often neither internally consistent nor aligned with the definitions in management theory or forecast theory. This is related to the behavioural influences of reward systems on the entire forecast process often being so deeply ingrained in the corporate culture and processes that individuals lose explicit cognitive awareness of the factors influencing their behaviour.

Addressing all of the implications of these issues to the approach defined in the preceding article is well beyond the scope of this commentary. However, as a minimum they need to be recognised and allowed for by the audit team. As a specific recommendation, it may be useful for the audit stage to initially focus on the latter stages of the forecast

process (e.g. the requestors and users of the forecast) so that a better understanding of the influences at work can be established and used in the auditing of the earlier stages (the actual forecast process).

An understanding of such influences would be aided by asking not only process questions (e.g. "What do you do with that information?") but also motivational questions (e.g. "What is the impact on you of an error?") and related impact questions ("Are some errors more severe than others: high versus low, start of year versus end of year?"). In practice such questions reveal a mixture of issues; for example the impact of an error may be related to time of year due to business issues (e.g. market seasonality), corporate issues (e.g. reaction of equity markets to year-end numbers), or personal factors (e.g. sales bonus factors related to time of year). However, the factors related to reward structures can be separated out and the other data can be used elsewhere.

In the 'way forward' stage, recommendations need to take into account bias that can introduced by such reward systems. This can be done by either changing the reward structure (e.g. team rewards for accurate forecasts rather than rewards for beating forecasts) or through the use of checks and balances. For example, Fildes and Hastings (1994) described an 'idealised' forecasting system which has a number of attributes applicable to the forecast process which would help address bias due to personal benefit (e.g. involving both top-down and bottom-up elements), although this wasn't the specific intention of the model. Structures to expose and constrain personal bias are also considered by Galbraith and Merrill (1996) and Gonik (1978). Aside from ensuring that recommendations address the issues of reward systems, the impact of recommendations on individuals needs to be considered and resolved as part of addressing the issue of companies not implementing the 'way-forward'.

Related considerations

Aside from increasing performance related pay, individuals may wish to bias forecasts for a variety of other objectives. These include optimistic forecasts to secure funding and resource requests (Galbraith and Merrill, 1996; Sanders and Manrodt, 1994; Tyebjee, 1987), use of extreme forecasts to achieve greater recognition (Batchelor and Dua, 1990), or biased forecasts in the interests of financial prudence (Bretschneider and Gorr, 1991). Although corporate encouragement of such objectives is often unintentional, the results are widespread, as illustrated by Galbraith and Merrill (1996) and Fildes and Hastings (1994) whose surveys show that forecasts were frequently modified in response to a variety of motivations. Consequently, development of the approach described by the article would need to consider a variety of personal and corporate objectives and motivations beyond the immediately apparent (e.g. sales bonuses).

Consideration also needs to be given to the corporate objective of the forecast process. The common assumption that it is used to gain a view of what will happen (e.g. probable level of sales) is highly questionable. A survey by White (1986) has 64 per cent of the respondents regarding the purpose of a sales forecast as a goal setting device and only 30 per cent wanted to derive a true estimate of the market potential. Research by this author found that many managers preferred a somewhat inaccurate forecast as a motivational tool, although they differed in that some felt this was best achieved by an optimistic forecast that would 'stretch' employees while others felt that this was best achieved by a slightly pessimistic forecast that would allow employees to exceed and have a feeling of success. The preference for biased forecasts is also supported by Sanders and Manrodt (1994) survey of US companies which found that 70.4 per cent preferred to underforecast and 14.6 per cent preferred to overforecast. Likewise, Lawrence et al. (2000) noted that each of the thirteen organisations in their study "stated that they preferred accurate forecasts" but more detailed information showed that if errors had to be made, six preferred under-forecasting and five preferred over-forecasting, with only two companies having a preference for no bias in either direction. Further research would be needed to determine the extent to which this is due to reward factors as opposed to valid business considerations (e.g. asymmetric business risks), but recognition that both individuals and organisations may prefer biased forecasts for a variety of reasons needs to be addressed as part of any corporate audit of forecast practice and recommendations.

The importance of such non-accuracy considera-

tions may also offer a partial explanation for the prevalence of qualitative techniques over quantitative techniques in business organisations (Mady, 2000; Mentzer and Kahn, 1995) when they often offer little or no incremental accuracy benefit, along with the general failure to measure forecast accuracy (Fildes and Hastings, 1994; Jones et al., 1997; Winkihofer et al., 1996). If the objective of the forecast is largely motivational rather than accuracy as such, the greater involvement associated with qualitative techniques may be the over-whelming consideration, while the importance of accuracy measurement is corresponding reduced (and potentially counter productive). As such, appropriate allowances need to be made as part of "way-forward" recommendations that propose greater use of qualitative techniques and accuracy measurements.

Doug Stewart, President, *Astra Consultants*

Business Forecasting: A Macro Approach - Heidi Winklhofer,

Initial reading of this paper reminded me of a commentary to a paper by Makridakis (1996) entitled: 'Forecasting: its role and value for planning and strategy' in which he illustrates two approaches to long-term forecasting and their use in planning and strategy. One of the commentators to this paper wrote:

> *"The debate is no longer about mathematical techniques in handling time series but rather about how to conduct the basic intelligence work which is needed in the first place, and how to put ourselves in the position of doing it. This requires a genuine revolution in transforming our ways of thinking about the future and the consequences involved in management our organisations, governing our economy and thinking about theory in relation to practice. "* (Faucheux, 1996, p. 546).

I would like to use this commentary to illustrate why behind this rather practically-oriented description of a forecasting audit, this paper also made me rethink the way we approach forecasting research, as well as forecasting training /education.

Articles dealing with forecasting practice are usually case studies or reports on business surveys. This paper goes a step further, it looks at business forecasting from a macro perspective by suggesting a way to audit all forecasting activities within an organisation. Thus, unlike the majority of work in forecasting, it does not focus on a particular forecasting issue, but looks at business forecasting in a more holistic way.

Although those who conduct research into forecasting are aware that their work often just touches on details of the overall forecasting process, this paper clearly reminds us how company forecasting is embedded into a complex organisational set-up and is consequently governed by many internal and external forces.

The literature review included in this paper provides an indication of how comparatively little research has been undertaken in the area of forecasting management. What emerges is that we seem to know a great deal about the technical side of forecasting but very little about managing forecasting-related activities and their uses. Against this background, I see this paper not only as a good description of a forecasting audit, but more as encouragement for future research in this area.

The authors state that they have identified only three frameworks to serve as standards against which forecasting processes can be compared. Instead of integrating all three and developing an all-encompassing one, the authors have chosen to follow the one developed by Mentzer, Bienstock and Kahn (1999). Although this framework appears to be the most comprehensive, I agree with the authors that some additional work is necessary to ensure that all important criteria are included in future audit work. For example, would one not consider overall top management support and company attitude towards forecasting as relevant criteria to be included when auditing the overall forecasting process of a company'? But, where would these two factors belong within the existing categories? Can they fit under the heading "functional integration" or "approach" or "systems"'? I do not think they do; the reasons for this is that the audit process as represented above mainly captures objective criteria and to a much lesser extent, the attitudinal aspects, i.e. the reasons behind certain behaviours.

This point particularly concerned me when reading that 10 out of the 16 companies investigated ex-

hibited a limited commitment to sales forecasting. The authors attributed this lack of commitment to a lack of organisational structure or activities which one would expect to be present in highly-committed firms. Several earlier surveys have also reported a lack of commitment to forecasting. Do we have an explanation for this lack of commitment? What are the underlying reasons for this? Research by Diamantopoulos and Winklhofer (1998) shows that some firms simply believe that the consequences of incorrect forecasts are limited for their particular business. One could therefore conclude that, in such cases, the marginal benefits from "better" forecasts are low. The point I am trying to make is that an extensive audit is only *a necessary but not sufficient* condition for "better" forecasting practice within a business. Implementation of potential changes will only occur if the reasons for the initial lack of commitment are understood. I would therefore suggest that future work on audits includes an initial analysis of the rationale for the current state of forecasting practice in the current organisations. Particular organisations have particular cultural and historical factors which they would need to transcend.

The audit approach suggested by the authors separates two different issues: firstly, what are the important criteria which should be included in an audit and, secondly, what is the "state" of each of these criteria at various stages of forecasting sophistication. An incremental improvement works for ordinal/continuous variables where we can observe a progression from stage l to stage 4. However, it does not work for nominal variables, such as whether there is a forecasting champion present (yes/no). One could then ask the question, whether the existence of a forecasting champion should belong to stage 2, 3 or 4. With this example, I want to illustrate that the allocation of criteria which describe each of the four forecasting stages are, as the authors admit, chosen on the basis of the initial benchmarking exercise and might require some additional research. However, I believe that the characterisation of the stages provides a very good starting point. I also agree with the authors that the applicability of the audit framework needs to be tested in different industry and organisational settings and under different operating conditions.

On a more general note, as mentioned in my introduction, this paper encourages researchers in forecasting to rethink our efforts in this area. The fact remains that despite occasional warnings and encouragement to undertake more research on forecasting management, only a minority of researchers in the area of forecasting follows such a path. This begs the question: why? Is it that researchers in forecasting do not have the necessary set of skills to undertake research on forecasting management, or is it that we are not sufficiently motivated to do such research (be it due to lack of interest, research funding, publication opportunities, etc)?

The relatively small amount of high quality research published on forecasting practice comprises of survey work and extensive case studies. Comparing such survey questions with the level of detail necessary for a forecasting audit, one immediately notices that past surveys on forecasting practice are somewhat limited in content. A thorough qualitative study, as undertaken by the authors lends itself more to exploring the relevant issues and gaining a deeper understanding of forecasting practice. This in turn can serve as a sound foundation for high quality quantitative research.

Our research interest in forecasting is also reflected in the way forecasting is taught in business schools. A survey by Hanke and Weigand (1994), for example, only asked about the type of techniques (mainly quantitative techniques were listed) and the extent of computer usage in order to capture the course content. This illustrates, that data collection, monitoring, evaluation of techniques, and in particular forecasting management are neglected in forecasting courses, despite the fact that the intended audience of most forecasting courses are future managers/decision makers and not forecasters (Kress, 1988). I wonder whether the lack of importance attached to forecasting management and the overall perception of forecasting in business is a reflection of how forecasting is taught in many business schools. I am not suggesting that the necessary set of skills for undertaking quantitative analysis should not be taught (quite the opposite). What I am concerned about is that courses on forecasting should not focus on techniques *only* but should encompass an understanding of forecasting *management* activities. This means that teaching

forecasting should be linked with courses on strategy, organisational behaviour, information systems, marketing, to name but a few. Despite all the effort we put into research and teaching forecasting methods, we need to be aware that the preparation of forecasts is only a service function within an organisation and forecasts will only be appreciated if they fit into the overall organisational set-up. In marketing terms, one could say that forecasters need to move away from a production orientation (producing forecasts) to a service orientation (producing forecasts which are required by actual/potential forecast users) where the augmented dimension of the product is highly important (e.g. is the forecasting system compatible with other computer systems in the firm?). This point has also been highlighted in the paper by Mentzer (1999).

What appears to be the case is that the major challenge in forecasting for many organisations arises from management-related issues. In this context, information technology is bringing companies closer together and forecasting problems of companies within a supply chain can often no longer be seen in isolation but have to be tackled within this information-sharing network of organisations. As this trend is likely to continue, it is imperative that, as forecasting researchers, we provide the necessary tools and theoretically-founded guidance. Like forecasters in organisations, we as academics have to work more closely with our colleagues in strategy, information systems, organisational behaviour, management science, and marketing if we are to effectively address what are clearly multi-disciplinary problems.

On a final note, the auditing instrument proposed has been designed for large organisations and the methodology suggested is directed towards external consultants performing the audit. On the other hand, I believe that the instrument is general enough to be suitable for smaller organisations, even within the context of an internal audit. Having said this, I appreciate that any internal analysis of the forecasting process is likely to be hampered by company politics, however, the perceived usefulness of any forecasting audit tool will depend on the prevailing company culture.

In summary, the paper has demonstrated that high quality forecasting within companies requires a company culture which recognises how highly interlinked forecasting is with other areas of the organisation and that high quality forecasting requires strong co-operations between various units and individuals. Against this background I strongly believe that high quality research into forecasting practice equally requires co-operation with scholars from different disciplines and the integration of concepts/theorems already developed in areas such as human resource management, organisational behaviour, computer science to name but a few.

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Conducting a Sales Forecasting Audit: Responses to the Commentaries - John T. Mentzer and Mark A. Moon

We appreciate the insightful comments from Bretschneider, Collopy, Lawrence, Stewart, and Winklhofer; in particular, their comments calling for more research of this type - i.e., sales forecasting management research. We agree that sales forecasting is more than just techniques and systems, and our discipline is poorer for ignoring the qualitative, managerial aspects of the role of sales forecasting within organizations. To this point, the commentaries make some excellent points in suggesting future research directions in this managerial vein, and we will not burden the reader with a recapitulation of these points here. The commentaries are also complimentary on various points made in our paper and, again, we appreciate them but will not repeat them here.

There are, however, several points the commentaries make that we feel need to be addressed. First, Bretschneider began by stating the paper fell short on several aspects of sales forecasting management research, and referred to a recent International Symposium on Forecasting session he chaired which identified lack of research training, lack of appropriate data, and lack of appropriate incentives as reasons for a lack of managerial research in this area.

We find it ironic that Bretschneider's first and second points (also raised in other commentaries) address material we were asked to delete by the

reviewers - material that established the "training" and the "data" that were necessary to conduct such qualitative, managerial research. This information addresses the "rigor" of qualitative research. Our paper is built upon a framework developed by Mentzer, Bienstock, and Kahn (1999), which used established qualitative research methodology. Qualitative research is useful to develop an understanding of a phenomenon about which little is yet known (Strauss and Corbin, 1990). McCracken (1988) argues that qualitative methods are useful for understanding the complex nature of a particular phenomenon of interest, while quantitative tools offer a complementary method to understand how widely the findings from qualitative research can be applied. According to Glaser and Strauss (1967), even if there is previous speculative theory, the process of discovery achieved through qualitative research gives us a theory that "fits" in a substantive area. Glaser and Strauss (1967, p. 32) suggest such theory development "can be achieved by a comparative analysis between or among groups within the same substantive area."

This audit research differed from grounded theory in that grounded theory does not assume any theory a priori, but builds or generates the theory entirely based on the data. In this research (and the Mentzer, Bienstock, and Kahn work), theoretical frameworks frequently used in managerial research were used as the basic frameworks of analysis and several a priori assumptions were used to guide the research. However, there are parallels with grounded theory methodology in that this research also emphasized discovery and theory development in a substantive area using qualitative data. Thus, tools and techniques were adapted from qualitative research methodologies, as appropriate, to ensure sound scientific research.

Glaser and Strauss (1967) sought to systematize the collection, coding, and analysis of qualitative data for the generation of theory. There are 3 major components of such qualitative research: the data, the analytic or interpretive procedures, and the written and verbal reports. Interviews and observations are the most common sources of data. Because this research aimed at understanding the management process, in-depth interviews (in conjunction with qualitative assessment of company documents) were utilized. Rubin and Rubin (1995) note that starting with theory can limit your vision of the phenomenon of interest, and that the qualitative researcher must be free to follow the data wherever it leads. Qualitative research requires a systematic effort to hear and understand what research participants have to say. In applying formal theory to a substantive area, the process of discovery toward developing substantive theory must balance the ability to direct the interview process to relevant areas, with the flexibility to pursue new ideas as they surface during the interviews. Thus, as is common in qualitative research, interviewing techniques were semi-structured to achieve this balance (the vehicle for these interviews was the protocol referred to in the paper). Techniques for analyzing and conceptualizing the data included coding, non-statistical sampling, writing and memos, and diagramming conceptual relationships.

For exploratory research such as this, literature is used for theoretical sensitivity, to provide concepts and relationships that are checked against the data. In other words, knowledge of existing theories can provide ways of approaching and interpreting data, can be used to stimulate questions, and can be used to direct theoretical sampling (Strauss and Corbin, 1990). While the Mentzer, Bienstock, and Kahn (1999) work was aimed at developing the framework, this research was aimed at an initial validation of this framework in a limited sample of companies - thus, the call in the paper for others to apply the framework to additional companies as on-going validation and refinement. As such, the Mentzer, Bienstock, and Kahn framework was used to guide the research design and data analysis.

As in grounded theory research, sampling was aimed at achieving theoretical saturation and representativeness rather than statistical generalizability (Glaser and Strauss, 1967; Strauss and Corbin, 1990). Theoretical sampling is cumulative, looking for variation and letting analysis guide additional data collection. A sampling plan is constructed, not to achieve generalizability, but rather to gain access to the categories and relationships associated with the phenomenon of interest (McCracken, 1988). The sampling plan of Mentzer, Bienstock, and Kahn (1999) was companies with a wide range of sales forecasting management success to observe factors

that relate to that success (which, we believe, addresses Lawrence's question about any research "demonstrating that organizations operating at early stages in the forecasting framework do in fact produce poor or inaccurate forecasts" in the broader sense of overall sales forecasting performance, not just accuracy). The sampling plan of the audit paper was companies that faced sales forecasting management challenges to test the efficacy of the audit methodology, and to observe the impact on sales forecasting performance of implementing the audit findings. To accomplish both these qualitative goals it was necessary to follow the advice of McCracken (1988) - it is more important to work carefully with a few people than to work superficially with many. Taylor (1994) argues that for qualitative research using in-depth interviews, a sample size of 15 to 30 individuals is typical to understand the phenomenon of interest. Since the sum total of the sample across the Mentzer, Bienstock, and Kahn (1999) study and this one is 36 companies (with an average of 30 interviews per company), we feel the criteria of saturation were met.

To Bretschneider's third point concerning incentives, it is interesting that we were encouraged by colleagues in the consulting arena not to publish this work, but rather keep the methodology confidential - i.e., use it for consulting purposes. However, as we try to make clear in the paper, our purpose in publishing this paper is to show others how to conduct an audit, and use it as a base for future research. Bretschneider is correct in that our incentive to do this was to contribute to the body of forecasting knowledge, which often runs athwart of the consulting incentive to keep information private unless paid for it.

We do have to take issue with Bretschneider's contention, throughout his commentary, that this research is prescriptive, without any "well-articulated causal mechanism." This research was based upon the work of Mentzer, Bienstock, and Kahn (1999), which did include in their sample companies that ran the continuum from struggling with forecasting performance to "world class" at forecasting management, and developed the framework that is a *qualitative, causal assessment* of the factors that lead to forecasting success. As Stewart points out in the first sentence (a point which contradicts Bretschneider), in the audit paper, we did provide qualitative information on companies that have implemented the audit findings and *have improved their forecasting performance.* Bretschneider cannot have it both ways - we cannot simultaneously call for more managerial, qualitative (albeit rigorous within the tradition of qualitative research) research and fault those same studies for a lack of "statistically significant" findings. In fact, we are surprised that Bretschneider equated "statistically significant" with "causal" since, as researchers, we all know that statistical significance only establishes statistical conclusion validity, which is not equivalent to causality. The force of theoretically based logic (i.e., qualitative assessment of the phenomenon) is required to establish causality. To paraphrase Bretschneider, it is this distinction, we believe, that indeed "separates the consultant from the researcher."

This seems to be Collopy's concern as well - who seems to argue that since sales forecasting management is complex, we cannot apply any "standards." This argument seems, to us, counter-productive - in essence, arguing that since the complexity of sales forecasting management is too great for simple solutions, why even bother trying'? Does the Mentzer, Bienstock, and Kahn framework we implemented need to be refined and improved? Of course, it does, and that is the realm of future research and the essence of programmatic research. However, the purpose of the audit paper was to demonstrate a methodology for implementing the framework over a number of companies *and improving* the framework through this and future research. This is not using "an audit to enforce one or another arbitrary practice" - it is using a framework (that is not "arbitrary" but rather, as discussed earlier here and in the audit paper, is grounded in previously published works) as a basis to understand a phenomenon and improve the framework. It is precisely this programmatic approach to research that adds to our understanding of complex phenomena.

This is similar to the point made in Lawrence's commentary. We agree there are nuances in the framework that must be acknowledged and subjected to additional research. Per Lawrence's example, merely stating that a forecasting champion exists does not qualify a company for Stage 3 in Functional

Integration. There are more complex aspects (i.e., the qualitative assessment) to being a forecasting champion than this simple statement implies (for more on the qualities of a forecasting champion, the reader is referred to Mentzer et al., 1997). However, what Lawrence referred to as a "course grid," we see as the not-always-quantifiable aspect of any qualitative assessment. We encourage all future research that helps "refine the grid."

We agree (and, in fact, did so in the paper) with Winklhofer's call for additional work on criteria, but find her choice of an example unfortunate - i.e., her contention that top management support should be included, when in fact it is in Stage 4 of the Approach dimension. Similarly, Winklhofer makes the point that an audit is "necessary but not sufficient" for forecasting management success, and we agree. In fact, that was the motivation in the paper for including examples of how companies (successfully and unsuccessfully) have reacted to the audits. We fervently hope the message in the paper is clear an audit without top management support (i.e., reacting appropriately to its findings) is a waste of time and corporate resources.

We wholeheartedly agree with Winklhofer's concludint comment. The audit instrument has been mainly applied to large organizations (although we fail to see how this leads to the conclusion that it is directed toward external consultants), and we encourage future researchers to test its applicability to smaller organizations.

Finally, Stewart makes an excellent concluding point that misuse of forecasting performance measures can completely derail the sales forecasting management improvement process. That is why we devote so much of the paper (indeed, one fourth - or one dimension - of the framework) to performance measurement, as well as the attention to "game playing" in the Approach dimension.

In conclusion, we would like to thank Bretschneider, Collopy, Lawrence, Stewart, and Winklhofer for their thoughtful and insightful comments. Many comments we wholeheartedly support, especially the directions for future research. We hope the areas where we took issue with their commentaries serve as a source of positive debate to help us all better understand the area of sales forecasting management.

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References

Armstrong, J. S. *(1987).* The forecasting audit. In: Makridakis, S. & Wheelwright, S. C. (Eds.), *The Handbook of Forecasting,* John Wiley & Sons, New York, pp. *584-602.*

Batchelor, R. A., & Dua, P. *(1990).* Product differentiation in the economic forecasting industry. *International Journal of Forecasting, 6, 311-316.*

Bretschneider, S., & Gorr, W. L. *(1991).* Economic, organizational, and political influences on biases in forecasting state sales tax receipts. *International Journal of Forecasting, 7, 457-466.*

Deschamps, E. *(2001).* The Impact of Institutional Change on Forecast Accuracy: A Case Study of Budget Forecasting in Washington State. Paper presented at the International Symposium on Forecasting (elaine.deschamps@cfc.wa.gov).

Diamantopoulos, A. & Winklhofer, H. *(1998).* A Conceptual Model of Export Sales Forecasting Practice and Performance: Development and Testing, In: Anderson, P. (Ed.), *Proceedings of the 27th European Marketing Acadeniv Conference* (May. Stockholm, Sweden), pp. *57-83.*

Faucheux, C. *(1996).* Comments on "Forecasting: its role and value for planning and strategy", by Spyros Makridakis. *International Journal of Forecasting, /2, 539-546.*

Fildes, R., & Hastings, R. (*1994).* The organization and Improvement of Market Forecasting. *Journal of the Operational Research Societ. 4.50), I-16.*

Fukuda, S., & Onodera, T. (2001). A new composite index of coincident economic indicators in Japan: how can we improve forecast performance. *International Journal of Forecasting, 3, 483-498.*

Galbraith. C. S.. & Merrill, G. B. (*1996).* The politics of forecasting: Managing the truth. *California Management Review, 38(2), 29-43.*

Gibson, C.. & Nolan, R. *(1974).* Managing the four stages of EDP growth. *Harvard Business Review, 52(1), 76-84.*

Glaser, B. G. & Strauss, A. L. (*1967). The Discovery of Grounded Theory: Strategies for Qualitative Research.* New York: Aldine Publishing Company.

Gonik, J. (*1978).* *Tic* salesmen's bonuses to their forecasts. *Harvard Business Review, 56(3), 116-123.*

Grubh, H., & Mason, A. (2001). Long lead-time forecasting of UK air passengers by Holt-Winters methods with damped trend. *International Journal of Forecasting, /7, 71-82.*

Hanke, J. E., & Weigand, P. *(1994).* What are Business Schools doing to educate forecasters'? *Journal of Business Forecasting, 13(3), 10-12.*

Jones, V. S., Bretschneider, S., & Gorr, W. *(1997).* Organizational pressures on forecast evaluation: managerial, political, and procedural influences. *Journal of Forecasting, 16, 241-254.*

Lawrence, M., & O'Connor, M. (2000). Sales forecasting updates: how good are they in practice? *International Journal of Forecasting, 16, 369-382.*

Lawrence, M., O'Connor, M., & Edmundson, R. *(2000).* A field study of sales forecasting accuracy and processes. *European Journal of Operations Research, 122, 151-160.*

Kress, G. *(1988).* Forecasting Courses for Managers. In: *Understanding Business Forecasting, 2 '"* ed. Graceway Publishing Company, USA.

McCracken, G. *(1988). The Long Interview,* Beverly Hills, CA: Sage Publications, Inc.

Mady, M. T. *(2000).* Sales forecasting practices of Egyptian public enterprises: survey evidence. *International Journal of Forecasting, 16, 359-368.*

Mahmoud, E., DeRoeck, R., Brown, R. G., & Rice, G. *(1992).* Bridging the gap between theory and practice in forecasting. *International Journal of Forecasting, 8, 251-267.*

Makridakis, S. G. (*1990). Forecasting, Planning, and Strategy for the 2/" Centurv.* The Free Press, New York.

Makridakis, S. (*1996).* Forecasting: Its role and value for planning and strategy. *International Journal of Forecasting, /2, 13-537.*

Mentzer, J. *T. (1999).* Forecasting Demand in the Longaberger Company, *Marketing Management.* Summer, *46-50.*

Mentzer, J. T., Bienstock, C. C., & Kahn, K. B. *(1999).* Benchmarking sales forecasting management. *Business Horizons, 42 48-56.*

Mentzer, J. T., & Kahn, K. B. (*1995).* Forecasting technique familiarity, satisfaction, usage, and application. *Journal 'if Forecasting, 14(5), 465-476.*

Mentzer, J. "I'., Moon, M. A., Kent, J. L., & Smith, C. *1). (1997).* The need for a forecasting champion. *Journal of Business Forecasting, /6(3), 3-8.*

Mentzer, J. T., Moon, M. A., Smith, C. D., *(2002).* Conducting a sales forecasting audit. *international Journal of Forecasting, 18, 19,*])It no: *50169-2070(02)00032-8.*

O'Connor, M. (*1989).* Models of human behaviour and confidence in judgment - A review. *International Journal of Forecasting, ?. 159-169.*

Pant, P. N., & Starhuck, *W. 1-1. (1990).* Innocents in the forest: Forecasting and research methods. *Journal o'"Management, /6, 433-460.*

Rubin, H. J. & Rubin, *I. S. (1995).* Chapter *2:* Foundations of Qualitative Interviewing, *Qualitative Interviewing: The Art of Hearing Data.* Thousand Oaks. CA: Sage Publications, Inc., *pp. 17-41.*

Sanders, N. R., & Manrodt, K. B. (*1994).* Forecasting practices in US Corporations: Survey results. *Interfaces, 24(2), 92-100.*

Sniezek, J. A. (*1989).* An examination of group process in judgmental forecasting. *International Journal of Forecasting, 5, 171-178.*

Stewart, D. *(2001). importance of Business Environment to Forecast Accurac.v,* Doctoral Thesis, Brunet University. Brunet.

Strauss, A. & Corbin. J. *(1990). Basics of Qualitative Research: Grounded Theory procedures and Techniques.* Newbury Park. CA: Sage Publications, Inc.

Taylor, R. E. *(1994).* Qualitative Research, *Mass Communication Research.* New York: Longman, pp. *265-279.*

Tkacz, G. *(2001).* Neural network forecasting of Canadian GDP growth. *International Journal of Forecasting, 17, 57-69.*

Tyebjee, T. T. *(1987).* Behavioral baises in new product forecasting. *International Journal of Forecasting, 3, 393-404.*

White, H. R. *(1986).* Sales Forecasting: Timesaving and Profitmaking Strategies That Work, Scott, Foresman and Company, London in Winklhofer, Heidi; Diamantopoulos, Adamantios.

Winklhofer, H., Diamantopoulos, A., & Witt, S. F. *(1996).* Forecasting practice: a review of the empirical literature and an agenda for future research. *International Journal of Forecasting, 12, 193-221.*

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