A Practical Approach to Sales Compensation: What Do We Know Now? What Should We Know in the Future?

Doug J. Chung, Harvard University

Byungyeon Kim, Harvard University

Niladri B. Syam, University of Missouri

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Abstract

Personal selling represents one of the most important elements in the marketing mix, and appropriate management of the sales force is vital to achieving the organization's objectives. Among the various instruments of sales management, compensation plays a pivotal role in motivating and incentivizing sales agents. This monograph reviews the evolution of research in sales compensation and discusses future trends and opportunities. Specifically, it examines the managerial relevance of the theoretical foundations, discussing the underlying reasons for their applicability (or lack thereof) in practice. Furthermore, the monograph surveys recent empirical methods—including field experiments and structural econometrics—that are practical for analyzing sales agents' behavior under various compensation systems. It also discusses prominent areas of future research in the midst of a changing sales environment. In particular, this monograph sheds light on how the use of big data, machine learning, and artificial intelligence can affect sales strategy formulation and, thus, sales compensation systems to better motivate and incentivize an organization's sales force.

Key words: sales compensation, sales management, sales strategy, principal-agent theory, structural econometrics, field experiments, machine learning, artificial intelligence.

1. Introduction

Personal selling plays a significant role in the world economy. In the United States, salespeople number around 15 million,[1] representing more than 10% of the entire labor force [U.S. Department of Labor, 2018]. A single salesperson[2] generates, on average, $10 million and $8.8 million in annual sales in the U.S. manufacturing and service industries, respectively [Selling Power, 2019]. The significance of these figures suggests that motivating salespeople in order to positively affect their behavior is vital to an organization's success. Sales force costs are the single largest marketing expenditure for U.S. firms, accounting for, on average, 10% of sales revenues and up to 40% in certain B2B industries [Albers and Mantrala, 2008]. Each year, U.S. organizations spend more than $800 billion to manage their sales force, with $200 billion devoted solely to compensation—an amount on par with the estimated $208 billion spending on media ($98 billion) and digital ($110 billion) advertising [Zoltners, Sinha, and Lorimer, 2013; MAGNA, 2018]. Such large investments strongly encourage organizations to continually improve the effectiveness of their compensation systems. Almost 80% of U.S. firms revise their compensation structure every two years or less, in an attempt to better motivate salespeople and to tailor their behavior to the constantly evolving sales environment [Zoltners, Sinha, and Lorimer, 2012].

[1] Representative industries include retailing (8.8 million), service (2 million), and wholesale and manufacturing (1.6 million).

[2] Hereafter, we interchangeably use the terms salesperson and sales agent (or simply agent) to refer to an individual who conducts personal-selling activities that connect an organization's product and/or services to its customers.

A successful compensation system effectively motivates the sales force so that an organization can synchronize its salespeople's activity (i.e., sales effort) with its objective(s). The success of the system likely hinges on how appropriately it recognizes and rewards each salesperson's effort. This seemingly easy link between effort and compensation becomes complicated because a salesperson's effort (typically) is unobserved by the firm. Hence, management needs to infer a salesperson's unobserved effort from the observed performance outcome. Compensation systems linked to the individual's performance outcome, such as commissions and quota-bonuses, are attempts to align the salesperson's interests with those of the firm.

The presence of various compensation components naturally leads to a practical question: Which compensation structure constitutes an ideal system? The short answer is that there is no "one-size-fits-all" solution. An ideal plan must take into account specific institutional and environmental contexts. Among other things, the duration and the uncertainty of the firm's selling cycle likely determine the ratio between fixed and variable compensation.[3] Because heterogeneous salespeople respond differently to various compensation components, an organization typically needs to use multiple components. Most importantly, a compensation system should align with the organization's sales strategy.

[3] Hereafter, we interchangeably use the terms fixed compensation (or fixed pay) and salary to refer to unconditional compensation, irrespective of a salesperson's performance. Similarly, we interchangeably use the terms variable compensation (or variable pay) and incentive compensation (or simply incentives) to refer to conditional compensation, based on a salesperson's performance.

This monograph takes readers through the evolution of academic research on sales compensation. By examining the relevance of existing research, it provides practical guidance on the design of an effective compensation system.[4] Furthermore, the monograph discusses how recent technological advances in artificial intelligence (AI) and machine learning (ML) shape sales strategy transformation and, thus, sales compensation systems of the future.

The remainder of the paper is organized as follows. Section 2 illustrates a practical outline for designing a sales compensation system and the associated dilemma that organizations often face. Section 3 examines the theoretical foundations of effective sales compensation structures and their validity—in particular, application of the principal-agent theory, which derives optimal compensation systems under the presence of agents' moral hazard. Section 4 addresses recent developments in field research: randomized field experiments jointly conducted by academics and organizations, as well as structural econometric methods using micro-level performance and compensation data. Section 5 illustrates how advances in technology affect organizations' sales strategies and, thus, the challenges and opportunities in utilizing compensation structure to motivate salespeople. Section 6 concludes.

2. Sales Compensation Design

[4] The focus of this monograph is to draw core insights of academic research from a practical standpoint. The studies discussed herein do not represent an exhaustive summary of the literature. For a more comprehensive review, see, e.g., Coughlan and Sen [1989], Albers and Mantrala [2008], Mantrala et al. [2010], Mantrala [2014], and Rouzies and Onyemah [2018].

Designing a compensation system is an elaborate, multi-stage process that involves consideration of the organization's comprehensive sales environment: the sales process, market characteristics, salespeople's preferences, and the competitive landscape. **Figure 1** depicts a five-stage process of designing a sales compensation system: (1) specify the objective; (2) determine total compensation; (3) set the ratio between fixed and variable compensation; (4) decide on specific variable components; and (5) link performance with compensation. Although the process is illustrated as sequential, in practice, such design occurs iteratively in stages and recursively over the years.

2.1. Specify the Objective

First and foremost, the objective(s) of the compensation system must be clearly outlined. The following questions help define the compensation objectives: (1) What is the organization's *desired outcome*? (2) What is the *sales process* that leads to this outcome? and (3) How must salespeople's *behavior* change to affect this sales process?

The desired outcome(s) of an organization govern the overall design of its compensation system. Such outcomes include, for example, increasing the bottom line, maintaining a balanced sales portfolio, promoting a specific product line, achieving targeted market share, attracting talented salespeople, and reducing employee attrition. While aiming for multiple outcomes in one fell swoop may seem desirable, different outcomes often require triggering different behaviors that may conflict with one another. For instance, when the emphasis is on maximizing revenue, generating any form of sales is desirable; however, this, in turn, may hurt the quality of sales (and, thus, profitability)

and harm long-term relationships with customers (and, thus, hurt future sales). Hence, organizations should evaluate the trade-offs and potential negative consequences to narrow down, as necessary, the outcomes to prioritize.

Based on their desired outcomes, organizations should identify the sales process (necessary sales tasks) that leads to those outcomes. The sales process should map onto the customer's purchasing process. Suppose, for instance, that the desired outcome is to increase market share. Then, the organization should actively expand its customer base by acquiring new customers. This requires reinforcing the front end of the organization's sales process (e.g., initiating the business relationship and increasing awareness of the product/service).

Subsequently, an organization should determine salespeople's behavior that it wants to change to affect the sales process. Hence, salespeople's behavior should have a clear connection with the sales process that leads to the organization's desired outcome. Consequently, the compensation system, as a lever, must embed incentive components whose evaluation criteria are tied to those behaviors. In the acquisition example above, the organization would want its salespeople to frequently go into the field to seek potential new customers. Thus, the resulting system should incentivize salespeople on factors such as the number of new accounts, total revenue from new accounts, the increase in the customer base, and/or the number of sales calls made.

2.2. Determine Total Compensation

Setting the right amount of expected total compensation (fixed salary plus variable incentives) is critical to maintaining a healthy sales force, as it determines the recruitment and selection of salespeople. When properly designed, the compensation system works to retain high-quality salespeople and to induce low performers to leave. However, employee attrition also involves substantial costs to the organization, including territory vacancies, jeopardized customer relationships, and costs related to hiring and training. Typically, salespeople exhibit high attrition: the estimated annual attrition rate of 27% is more than twice that of the average work force in the U.S. [Richardson, 1999]. The high attrition emphasizes the need to set an appropriate level of compensation to attract and retain talented salespeople.

2.3 Set the Ratio between Fixed and Variable Compensation

Given the level of total compensation, an organization needs to set the ratio between fixed and variable compensation. This ratio determines both the degree of motivation and riskiness of the compensation system. The appropriate ratio depends on several factors, including the selling process, the sales force characteristics, the competitive environment, and the organizational culture.

Fixed pay (salary) delivers a guaranteed amount of compensation based on, for example, within-firm and/or industry tenure. By providing some compensation unconditional on performance, fixed pay offers income stability and security. A high level of fixed pay is typically suitable when the selling cycle is long and uncertain, and the sales outcome is difficult to attribute to per-period effort.

Variable pay (incentives), on the other hand, has a clear connection with salespeople's performance and, thus, motivates them to achieve high performance. A high level of variable pay is more applicable when the selling cycle is short, and the sales outcome connects clearly to salespeople's effort.

In addition to the motivational role, the balance between fixed and variable pay also affects the type of salespeople an organization attracts. Fixed pay appeals to risk-averse people who value insurance, while variable pay attracts people who seek upside potential and are willing to take on risk. The composition of the sales force reflects the self-selection process and, thus, affects an organization's performance in the long run.

2.4 Decide on Specific Variable Components

An organization should choose specific variable (incentive) components to motivate different types of salespeople. Organizations typically offer multiple components (e.g., commissions, quota-bonuses, and overachievement commissions/bonuses) in their compensation system [Joseph and Kalwani, 1998].[5] **Figure 2** illustrates the relation between sales and a salesperson's income for typical compensation systems used in practice.

Commissions are payments that are proportional to performance outcomes, such as revenue and unit sales. They are typically linear (fixed rate over an interval), incremental (each unit of sales

[5] Although not considered in this monograph, there are compensation structures involving multiple agents, such as sales contests [Lim, Ahearne, and Ham, 2009] and team-based compensation [Chan, Li, and Pierce, 2014]. For an overview of these topics, see, e.g., Coughlan and Joseph [2012].

generates commission), and easy to administer. Quota-bonuses, on the other hand, grant a lump-sum amount contingent on the salesperson meeting a preset quota (goal).[6] By providing a stretch goal, bonuses effectively motivate high-performing salespeople [Chung, Steenburgh, and Sudhir, 2014]. More importantly, organizations can adjust for territory differences across salespeople by imposing different quotas.

Opting for a quota-bonus plan also involves setting the payout period. The payout can either occur simultaneously with the performance-evaluation period (e.g., monthly commissions) or be deferred and based on accumulated performance over several periods (e.g., end-of-year bonus). The goal-gradient hypothesis [Hull, 1932; 1938] suggests that having frequent payout periods—i.e., multiple finer goals instead of a single large goal—should lead to greater motivation and, thus, higher sales performance. Moreover, these frequent sub-goals enhance motivation especially in early periods, during which salespeople are concerned about whether the annual goal is attainable [Huang, Jin, and Zhang, 2017]. However, frequent payout periods may have undesirable effects, such as a decrease in the quality of effort and adverse product focus [Chung, Narayandas, and Chang, 2020].

The choice regarding specific incentive components and payout periods depends on the type of salespeople the organization wants to motivate. For low-performing salespeople, effective motivators are many small goals and pacer incentives (e.g., quarterly bonuses) that help keep them within striking distance of their long-term goals [Chung, Steenburgh, and Sudhir, 2014; Chung, Narayandas,

[6] Quotas can also be associated with commissions. Overachievement commissions, which offer a higher payout rate when a salesperson surpasses his or her quota, is an example of a quota-commission plan.

and Chang, 2020]. High performers, on the other hand, are better motivated by a few large goals, overachievement commissions, and no cap on pay, all of which induce them to exert continuous effort and to excel in their sales performance [Chung, 2015].

In evaluating the efficacy of incentive components, organizations often fall into the trap of conducting reverse-engineered simulations—predictions calibrated on performance outcomes from the previous compensation system. The assumption behind these simulations is that salespeople's behavior stays the same under an alternative system. However, as discussed previously, incentives are designed to change behavior, and, thus, reverse-engineered simulations are likely to be misleading. Proper methods for evaluating compensation effectiveness, which take into account causal change in behavior, are discussed in Section 4.

2.5 Link Performance with Compensation

When designing a compensation system, an organization needs to decide which performance metric(s) to link to the incentives. The selected metrics should align with the desired behavior discussed in Section 2.1, so that compensation serves as the impetus for the desired outcome. Moreover, to properly serve as a motivator, the metrics need to be within the salesperson's control and associated with his or her effort.

Performance measurement can be based on outcome (i.e., results), on behavior (i.e., input), or on both [Anderson and Oliver, 1987]. The outcome-based system emphasizes the objective and straightforward measures of results (e.g., revenue generated, units sold) and posits that the costs of

managerial overhead associated with monitoring salespeople outweigh the benefits. Hence, the system involves limited monitoring and managerial direction, which leaves salespeople to achieve results using their own tactics. The behavior-based system, in contrast, involves considerable monitoring of salespeople's activities and management intervention. Subjective and more-complex input measurements (e.g., attitude, product knowledge, number of calls made, hours worked, and peer evaluation) are used to evaluate and compensate the sales force.

For most of the modern era, academics and practitioners have focused on outcome-based measures to evaluate and compensate salespeople [Churchill et al., 1985]. These measures provide organizations with simple and equitable measurements of individual performance, without the need to engage in costly monitoring activities. However, recent advances in information technology, such as the application of mobile devices and live order/service tracking systems, have significantly reduced the cost of applying behavior-based measures. Furthermore, ML algorithms can now measure and track unstructured individual data for behavioral inference. Hence, an increasing number of organizations are supplementing their performance evaluation with behavior-based measures in an attempt to better infer salespeople's behavior.

3. Academic Research and Practice

For centuries, before their theoretical foundations were even considered, sales commissions have been a key motivator for salespeople [Powers et al., 1987]. The benefits of commissions are threefold. First, in most cases, organizations can easily measure and quantify a salesperson's short-term output

(sales). Second, organizations can have difficulty monitoring and supervising salespeople because the selling process typically occurs in the field; commissions mitigate this problem by aligning the salespeople's motive (income) with that of the organization (profit). Third, commissions appeal to people (and allow them to self-select into the occupation) who are highly motivated by performance-based rewards to pursue upside potential, a necessary trait to become a successful salesperson.

Because of the widespread applications and practical relevance of commission plans, these were the focus of early theoretical studies on the design of compensation systems. In a pioneering study, Farley [1964] shows that an optimal compensation system is comprised of a commission tied to gross margin (rather than sales volume). In two studies, Weinberg [1975; 1978] generalizes this idea to show that the results hold even when salespeople are given control over prices and when products are interdependent. The intuition behind these results is that a commission on gross margin, by providing a portion of the firm's total earnings, aligns the salesperson's incentive with that of the firm. However, the derived results are, in part, susceptible to different modeling assumptions.

While these early studies provide guidance on factors that determine the structure of effective compensation, they have a critical limitation regarding their modeling assumption—namely, a deterministic relation between sales and effort. This assumption implies that, if both the firm and the salesperson have the same information on the sales response to effort, the firm can precisely deduce the amount of effort that the agent exerts. Thus, a firm can design an optimal compensation system *without* including any commission pay (or, more generally, any variable pay), which contradicts the underlying premise of these studies [Basu et al., 1985]. More specifically, the firm

can induce an agent to exert the optimal level of effort through a *forcing contract*, in which the agent receives a specific wage if he or she meets a prespecified level of sales, and zero otherwise. In reality, however, one rarely observes such forcing contracts, as sales response to effort is not completely deterministic. Suppose, for example, that a large clinic in a pharmaceutical salesperson's region closes temporarily for office renovations. Then, regardless of that salesperson's effort, his or her performance would likely be low for that period.

A stochastic relation between an agent's effort and sales seems more realistic, as it accounts for uncertainty in the sales environment—that is, any luck or misfortune that the agent may encounter during the sales process. More importantly (and closer to reality), a stochastic relation between effort and sales implies that the firm cannot directly infer an agent's effort simply by observing his or her performance outcome. Hence, the firm must either base the compensation system on observable measures (e.g., sales revenue) or undertake a costly monitoring process. A moral hazard problem arises in the former setting, which leads to the principal-agent theory.

3.1 Moral Hazard and Principal-Agent Theory

The firm's inability to observe an agent's effort (i.e., hidden action) gives rise to the agent's *moral hazard*. The moral hazard problem depicts the case in which an agent (i.e., a salesperson), unsure of being compensated for his or her effort, may be reluctant to provide the optimal amount of effort. Although the principal (i.e., the firm) wants to extract maximum output from the agent, a salaried agent may shirk because the firm cannot observe the agent's effort.

The principal-agent theory [Mirrlees, 1999; Harris and Raviv, 1979; Holmström, 1979; Grossman and Hart, 1983] gives rise to contract designs that deal with moral hazard. In general, the theory describes problems that arise from conflicting interests between a principal and an agent. Although the principal cannot contract upon the unobservable action (e.g., effort), it can, indeed, incentivize the agent based on his or her observable and verifiable[7] outcome (e.g., sales), which is informative about the agent's action. This leads to implementing a compensation system that includes incentive components (e.g., commissions and quota-bonuses) conditional on observable performance outcomes. These incentive components help coordinate the (otherwise misaligned) interests between the principal and agent.

More formally, one can structure a basic moral hazard problem as follows. The firm's goal is to design a compensation system $\psi(q)$, determined by the agent's observable outcome q, such that it maximizes the firm's expected profit.[8] The underlying stochastic uncertainty in the environment is captured by the distribution $f(\cdot)$ of outcome q given agent's unobservable effort e:

$$\max_{\psi(q)} \int \left[q - \psi(q)\right] f(q \mid e) dq \,,$$

$$\text{s.t. } e \in \arg\max_{e} \int u(\psi(q)) f(q \mid e) dq - c(e) \,, \qquad \text{(IC)}$$

$$\int u(\psi(q)) f(q \mid e) dq - c(e) > \overline{u} \,. \qquad \text{(IR)}$$

[7] Verifiability indicates that an enforceable contract can be written based on the outcome.

[8] The firm's objective function can be altered to optimize on other desired outcomes beside profits.

The firm's optimization problem involves two constraints: incentive compatibility (IC) and individual rationality (IR). The incentive-compatibility (IC) constraint depicts the motivational role of the compensation system. The agent, who acts on the firm's behalf, exerts effort e such that it maximizes his or her own utility. This utility is comprised of the pecuniary income $u(\psi(q))$ and (monetary equivalent) disutility of effort $c(e)$. The agent's effort e (unobserved by the firm) is assumed to *stochastically increase* the firm's desired outcome q[9] and, thus, the agent's compensation. The individual-rationality (IR) constraint, sometimes referred to as the participation constraint (PC), reflects the agent's potential outside option. That is, the contract must provide minimal rent $\overline{u}$ in order to prevent the agent from leaving the firm.

Given this setting, Holmström [1979] shows that the optimal compensation system $\psi(q)$ is increasing in observable output q. The resulting system, however, is only a second-best solution that is strictly inferior to a first-best that is achieved when the firm (hypothetically) observes the agent's effort e and makes a forcing contract with a fixed wage (attained upon the agent exerting the firm's desired level of effort). Furthermore, Holmström [1979] discusses the value of information. When there exists an observable and verifiable signal s that provides information about the agent's action e, it is possible for the firm to design a new contract $\psi(q,s)$ that strictly Pareto dominates a contact $\psi(q)$ using only an observable outcome. This result provides support for compensation systems that supplement behavior-based measures and highlights the role of monitoring.

[9] A formal definition is the monotone likelihood ratio property (MLRP).

The principal-agent theory offers an effective lens through which to see the moral hazard problem that arises in a typical sales setting and, thus, has served as the workhorse in studying sales compensation. By addressing various circumstances of the sales environment, studies have identified a number of factors that lead to the design of an effective sales compensation system.

3.2 Theoretical Development

Based on the principal-agent framework, Basu et al. [1985] explores the design of an optimal sales compensation system and find that the shape of the plan depends on the risk characteristics of the salesperson. The plan takes a convex (concave) increasing function of the sales outcome if the salesperson's risk tolerance increases (stays constant) with income. In practice, such smooth and curvilinear compensation plans are approximated using a combination of piecewise linear schemes. Hence, the study provides theoretical support to some of the commonly administered compensation systems, including (1) salary only, (2) straight or sliding commissions, (3) a combination of salary and commissions, and (4) salary and over-achievement commissions above quota.

Perhaps more importantly, Basu et al. [1985] evaluates how various factors (e.g., salesperson characteristics and the sales environment) affect the design of an optimal compensation system. The study's results provide a meaningful explanation of how different firm/industry characteristics lead to differences in the types of compensation systems used. For instance, the study explores how the level of uncertainty in an industry's selling cycle should influence pay systems—the more (less) uncertain a firm's selling cycle, the more a salesperson's pay should be based on a fixed salary

(commissions). **Table 1** illustrates the comparative statics of Basu et al. [1985] with regard to the level of uncertainty in the sales cycle, marginal cost of production, attractiveness of alternative job opportunities, sales effectiveness, and baseline sales level with zero effort. The findings can serve as a guideline for managers when choosing the mix between salary and commissions.

The pioneering application of the principal-agent theory in Basu et al. [1985] triggered subsequent interest in the field of sales compensation. A number of studies attempt to relax some of the assumptions and to verify the results. Lal and Staelin [1986] relaxes the assumption on information symmetry in the selling environment between the firm and the sales agent. For instance, a sales manager may be less informed about the salesperson's ability and/or the characteristics of his or her territory. The study's results show that when heterogeneity among salespeople exists, firms can provide a menu of incentives, each of which appeals to different segments of the sales force. By letting salespeople (based on their private information) choose a contract that is in their best interest, the firm can compensate for both the gap in knowledge and the differences in ability across the sales force. Relatedly, Rao [1990] shows that the optimal menu does not necessarily need to involve various compensation structures, but can differ only in quotas tailored to each salesperson.

An important boundary in Basu et al. [1985] and subsequent studies is that the agents respond only to a single-period problem (i.e., a static setting). In other words, the agent exerts effort in response to the firm's compensation system and does not alter his or her behavior based on the interim realization of sales. In reality, however, a salesperson makes a number of effort-level decisions (e.g., daily) over the course of the performance-evaluation period (e.g., monthly), taking into account

the success and failure of his or her past efforts. For instance, a salesperson who experiences a bad start under a monthly-quota plan may stop exerting effort during the later weeks because there is no chance of meeting quota.

Such dynamics in the sales environment give rise to the provision of intertemporal incentives. Considering the intertemporal nature of decision-making, Holmström and Milgrom [1987] finds that linear commissions (i.e., equal rate commissions regardless of the sales level) based on total sales over the performance-evaluation period constitute an optimal solution. The reason is that, when a firm offers a menu of different incentive structures (e.g., quota-bonuses, overachievement rewards), the agent can find ways to game the system, such as manipulating the timing of sales transactions. A salesperson who is short on his or her annual quota may "pull" sales, which would ordinarily be made in January of the following year, to late December (by asking the customer to book them in advance). Conversely, a salesperson who has already made quota may "push" December sales to January in an attempt to get a head start on the next year's quota. These variations in effort and outcome over time are costly to the firm. By having a simple linear commission, the firm can induce the agent to exert a consistent level of effort that is unaffected by the amount of past sales.

Lal and Srinivasan [1993] applies the structure of Holmström and Milgrom [1987] to examining the design of a multi-product firm's sales compensation system and find that the commission rate should be high for products with lower uncertainty in sales, higher sales-effort effectiveness, and lower marginal costs. This implies that firms should mainly use commissions to compensate salespeople when the sale of their products occurs frequently; when their performance is directly

correlated with effort; and when the selling environment is less uncertain (e.g., a door-to-door salesperson who has a chance to book revenue every day). In contrast, commissions may not be suitable for sales of high-margin products, which require greater accumulated sales effort to sell. Consider IBM, for example, whose salespeople can spend months engaging with a client before closing a deal for an enterprise cloud solution. The firm would struggle to make adequate profit and retain its salespeople if its compensation depended only on commissions.

The theoretical studies discussed thus far have promoted the idea that the optimal incentive consists only of commissions coupled with a base salary. While a simple, linear form of compensation can be appealing, commissions, in practice, are often combined with other incentive components, such as quota-bonuses. According to Joseph and Kalwani [1998], a quota-bonus is the most commonly administered incentive by U.S. organizations—with approximately 72% of the firms in the study's sample using some form of a quota-bonus. In recognition of the heterogeneity of the sales force, firms often opt for a more complex structure in which each of the multiple components of the compensation system appeals to a different group of salespeople.

Hence, subsequent studies attempt to resolve this discrepancy between theory and practice, specifically to justify the existence of quota-based systems. Raju and Srinivasan [1996] suggests that, although a quota-commission plan may be suboptimal from a theoretical perspective, it provides the best compromise between theoretical efficiency and practical ease of implementation. The study demonstrates that a quota-commission scheme is essentially a piecewise linear approximation of the theoretical optimal compensation system with a discontinuity at the quota, whose non-optimality

from approximation is less than 1%. However, most quota-based compensation plans provide not only commissions, but also a lump-sum bonus, conditional on achieving quota. In a static environment, Oyer [2000] finds that a combination of a quota-bonus and a linear overachievement commission can constitute a uniquely optimal plan. The assumption is that the agent's IR constraint is unbinding (i.e., the agent captures some rent above the outside option); and the rationale behind optimality of quotas is similar to that of the forcing contract discussed previously. The firm, without concern about violating the agent's IR constraint, can concentrate the marginal incentive, conditional on meeting the minimal level of desired sales (i.e., the quota).

The motivational role of sales quotas, however, tends to be intertemporal. In response to a quota-bonus compensation plan, a sales agent's motivation is at the maximum when the agent has a moderate chance of meeting quota, and it is at the minimum (close to zero) when the agent has already attained or has no chance of attaining quota. Thus, the above static models of agent behavior are limited in accounting for the dynamic allocation of the agent's effort over time (under a quota-based compensation scheme).

Addressing the dynamic allocation of effort in a quota-bonus environment, Schöttner [2016] reconciles the relation between commissions and bonuses. Based on the degree of the agent's responsiveness to incentives, the study finds conditions under which a linear incentive scheme dominates a bonus plan, and vice versa. A combination of commissions and a quota-bonus better motivates the agent who is difficult to motivate during the early periods. Given the chance to attain a lump-sum bonus in addition to commissions, agents exert greater effort at the outset of the

performance-evaluation period. Hence, compared to a commission-only plan, the firm can induce early-period motivation at a lower cost by adding a bonus component. In contrast, when the agent is difficult to incentivize toward the end of the period, a bonus becomes less effective and a pure commission scheme becomes optimal.

The theoretical lens brings meaningful insights into the design and implementation of sales compensation systems. The comparative statics help illustrate the relation between various behavioral/environmental factors and the compensation structure (e.g., the relative importance of salary versus incentives; and the level of total compensation). Before various empirical methods emerged, one could rely only on theory to make predictions about the effectiveness of various compensation components.

In practice, however, organizations devise their compensation system conditional on various institutional/environmental factors and constraints. It is challenging to capture these factors, in whole or in part, with a stylized theoretical model. Therefore, in an effort to design a compensation system tailored to their own environment and needs, organizations began to collaborate with academics, using appropriate empirical methods. Indeed, recent empirical studies reveal several interesting insights about effective ways to compensate salespeople, most of which both academics and organizations overlooked during the development of theory.

4. Empirical Applications

Most of the early empirical work centers on validating theory [John and Weitz, 1989; Coughlan and Sen, 1989; Coughlan and Narasimhan, 1992; Lal, Outland, and Staelin, 1994; Misra, Coughlan, and Narasimhan, 2005]. In response to the proliferating theoretical predictions, these studies attempt to quantify the effect of various environmental factors on the structure of compensation systems—namely, the ratio between fixed and variable compensation. In general, the empirical validations support the theoretical findings, but due to data limitations, the tests are conducted over only a subset of the theoretical hypotheses.[10]

In the earlier days of empirical research, organizations were reluctant to share detailed compensation-related data for confidentiality reasons. Hence, the above studies are limited to analyzing aggregate- (i.e., industry- or firm-) level data [John and Weitz, 1989; Coughlan and Sen, 1989; Coughlan and Narasimhan, 1992; Misra, Coughlan, and Narasimhan, 2005] or survey data [Lal, Outland, and Staelin, 1994]. These data restrictions lead to *indirect* hypotheses testing over tractable measures (e.g., expected total income and proportion of salary), rather than *directly* testing the theoretical predictions (e.g., on commission rate and on firm productivity).

During the past decade, however, organizations have begun to collaborate with academics in attempt to apply state-of-the-art modeling and estimation techniques and to better identify causal effects. As a result, empirical studies have started to move beyond validating theory and into

[10] For a detailed review of theory validation, see Coughlan and Joseph [2012].

deriving practically relevant findings that help organizations design effective sales compensation systems.

For example, using micro-level (i.e., individuals within a firm) data, Steenburgh [2008] examines the motivating role of quota-bonuses. Specifically, the study analyzes individual-level sales data and examines the existence of timing games. Is there empirical evidence of salespeople pushing or pulling sales from one quarter to another so that they can better achieve quotas and earn incentives? This is an important managerial question. Because pushing and pulling sales do not necessary increase a firm's revenue over time and may harm the long-term relationship with the customer, quota-based compensation may be suboptimal for the firm. However, Steenburgh [2008] finds lack of evidence for timing games, despite the fact that salespeople could attain substantial bonuses for achieving quotas. The rationale is twofold: the firm's customers require sales to close according to their own needs (specific purchase cycles); and the firm's managers monitor the salespeople to prevent timing games.

Successive collaborations between organizations and academics have resulted in a number of interesting insights into the design of effective compensation systems. The research stream consists of (1) field interventions and experiments based on modifications of real-world compensation systems; and (2) structural econometric methods using micro-level performance and compensation data.

4.1 Field Interventions and Controlled Field Experiments

The most straightforward way to evaluate the effectiveness of different compensation systems is to conduct a field experiment—an exogenous intervention for a treatment in a real working environment, using a control group as a base. In the past, however, organizations were cautious about conducting experiments in an actual work setting (both in sales and other settings), for fear that manipulating people's behavior might jeopardize both their current and future performance. For this reason, early experiments on compensation were mostly lab- or survey-based, both of which, by design, focus on imaginary choices rather than on actual choices. Even the few studies that involve actual choices have relied on observations of temporary employees, hired specifically for the experiment, rather than those of permanent employees. Therefore, the generalizability of early experimental studies for real-world working environments remains questionable.

However, by working in the field with academics to design their compensation systems, organizations can supplement management practice with causal inference; they benefit from verifying an advanced system design tailored to their desired objective, while researchers test their hypotheses on various components beyond a theoretical framework. As an early attempt at collaboration (though not a field experiment), Misra and Nair [2011] uses a firm's field data to *validate* the study's model. The model projected that if the firm removed the cap on salespeople's earnings and eliminated quotas, sales would increase by 8%. The company implemented those recommendations, and the firm's revenue rose by 9% in the subsequent year.

Through a large-scale *field intervention*, Kishore et al. [2013] examines the differential effects of quota-bonuses and commissions. The pharmaceutical firm in the study switched from a quota-bonus

to a commission system and witnessed an improvement in sales productivity—especially by low-performing salespeople. The quota-bonus system in the pre-intervention period suffered from the timing game of the salespeople [Steenburgh, 2008]. Although the post-intervention commission system induced greater neglect of non-incentivized sales tasks, the benefits of the short-term revenue gain outweighed the previous costs (i.e., fluctuation in output) associated with timing games.

In another field intervention, Viswanathan et al. [2018] examines the effectiveness of providing nonmonetary compensation. The study's results show that, upon switching from a "cash plus merchandise" bonus to an "all-cash" incentive system, the firm encountered a decrease in sales—especially by high-performing salespeople. That is, salespeople valued a noncash incentive more than an equivalent cash incentive, which contradicts the liquidity appeal of cash. The study's findings imply that, under certain conditions, an appropriate mix between cash and non-cash compensation can appropriately motivate salespeople.

While the above field validations and interventions provide descriptive and suggestive evidence for alternative compensation systems, the absence of a control group (i.e., a group of subjects who are not treated but whose performance captures the underlying seasonality) limits causal interpretation of the findings. Hence, for accurate causal inference, organizations and academics have begun to collaborate on randomized field experiments that generate exogenous variations in ways to compensate employees.

In a controlled *field experiment*, Chung and Narayandas [2017] examines the effectiveness of various forms of conditional and unconditional compensation in collaboration with a firm that sells

consumer durable products. The firm's existing base plan was a simple, linear commission scheme similar to the one advocated by Holmström and Milgrom [1987]. The field experiment lasted for six months, during which the firm exogenously varied the sales compensation system for its full-time salespeople.

The study's results show that, although the loss-framing of incentives (i.e., framed as a penalty for not attaining quota) initially induces salespeople to exert greater effort, it is effective only in the short run and fades away after multiple exposures. Furthermore, aggressive use of conditional incentives can potentially demotivate salespeople from exerting effort in future periods. Offering extrinsic incentives, such as quota-bonuses, shifts a salesperson's motivation cue to extrinsic motivation (wanting to perform to obtain a reward) and crowds out intrinsic motivation (wanting to perform because of the interest in and enjoyment of the task itself) [Lepper, Greene, and Nisbett, 1973]. Thus, organizations should be aware of the potential negative effects of using incentives: if an organization gives salespeople an incentive but then takes it away, their performance may be even lower than it would have been without the initial incentive.

A more recent study, Chung, Narayandas, and Chang [2020], examines the causal effects of a quota (evaluation) cycle's frequency on various dimensions of sales performance. The field experiment was conducted with a Swedish retail firm that varied the frequency of quotas and employed a control group that did not experience a change. The study reveals that a shorter quota cycle (i.e., more frequent evaluation periods) increases the sales productivity of low-performing salespeople. Frequent quotas help low performers by preventing them from giving up in later periods

following a number of unsuccessful outcomes (negative sales shocks) in earlier periods within a quota cycle. Because the salesperson receives frequent fresh starts, his or her motivation stays intact, whereas in a less-frequent quota cycle, the salesperson gives up in later periods, after several unsuccessful outcomes, because there is no chance of achieving quota.

The increase in sales of low performers, however, comes at a cost. As goals become granular, the high performers, who previously promoted high-value-added products, focus on low-ticket products. This change in behavior leads to a decrease in sales by the high-performing salespeople. Hence, the study's results demonstrate the importance of understanding the potential trade-offs that arise from a long vs. a short quota cycle and the differential effect on heterogeneous salespeople.

4.2 Structural Econometric Methods

Although field experiments are attractive because a researcher or organization can tease out the pure causal effect of compensation, more often than not, executing a controlled field experiment raises challenges from both practical and academic standpoints. Field experiments bring about fairness concerns: managers fear the *watercooler effect*, in which salespeople share information with one another about their compensation plan. The information sharing may raise questions of trustworthiness and lead to resentment. Relatedly, the spillover of information between the treatment and control groups may contaminate the experiment, incorrectly specifying the direction and/or the magnitude of the treatment effect. Moreover, field experiments can provide only limited inference regarding long-term outcomes. Because of concerns over cost and fairness, controlled

experiments typically take place over a short period, likely several months at most. Thus, field experiments have limited applicability for organizations with long sales cycles, such as those that sell B2B industrial products and services. Lastly, there is a limit to the scope of the experiment. The set of treatments needs to be kept simple, as the causal effect can be traced back only to a specific treatment. Hence, field experiments are less suitable for testing multiple hypotheses and complex changes in a compensation system.

When a field experiment is not feasible, the researcher (and the organization) must use transaction data to examine the effectiveness of a compensation system. Using historical data to identify the causal effect, however, has its own challenges. Often, an organization's compensation system exhibits limited variation during the data-observation period. Moreover, even the limited number of changes is likely to occur endogenously; that is, organizations may change their system due to underlying reasons not captured by the data.

Structural econometric methods provide a feasible solution to problems of limited variation and endogeneity [Misra and Nair, 2011; Chung, Steenburgh, and Sudhir, 2014; Chung, Kim, and Park, 2020]. Based on theoretical foundations of agent behavior, structural methods make inferences on *individual preferences*—i.e., the underlying source of salespeople's behavior—conditional on the compensation system. The estimated (structural) parameters are *policy-invariant*, in the sense that they pertain to the agent's characteristics and not to the compensation system (policy) per se. Therefore, structural methods lend themselves to various counterfactual predictions, which enable

organizations to analyze the benefits and costs of alternative compensation systems without having to rely on costly field experiments.

Misra and Nair [2011] analyzes the role of sales caps and ratcheting of quotas—updating a salesperson's quota based on his or her past performance. The analyzed firm had a relatively simple plan: a salary plus a standard commission on sales after achieving quota (similar to that proposed in Raju and Srinivasan [1996]), along with an upper cap on the earnings. The study concludes that a cap hurts overall sales and that the firm's practice of ratcheting quotas negatively affects salespeople's motivation. Setting and adjusting salespeople's quotas is an intricate task associated with sales compensation structure. If an organization does not adjust quotas, the incentive mechanism of quotas can diminish (e.g., when quotas are set either too high or too low). However, by raising a person's quota after a strong year of sales, the organization is, in effect, penalizing the top performers.

Organizations should set quotas based on factors that objectively determine market potential in a particular salesperson's territory. Typically, such objective factors are difficult to obtain, and so organizations have begun utilizing AI systems equipped with ML algorithms to set quotas [Chung et al., 2019]. Section 5 discusses this topic in detail.

Based on a collaboration with a Fortune 500 company that used a component-rich compensation system, Chung, Steenburgh, and Sudhir [2014] examines the heterogeneous effects of compensation. Specifically, the study examines the effectiveness of various incentive components for different types of salespeople (high, mid, and low performers) and finds that, although the salary and commission

equally affect all salespeople, the quota-bonus and the overachievement reward (escalated commission) appeal to different types of agents. For instance, the overachievement reward serves to keep the high performers motivated, even after they have achieved quota. The quarterly bonus is most effective with low performers, as frequent goals keep these salespeople on track. The annual bonus more effectively incentivizes the high performers. Hence, the study reveals that high performers can perform well under long-term, lump-sum goals, whereas low performers require short-term, granular incentives to be effectively motivated.

Through various counterfactual analyses (i.e., under a hypothetical alternative system), Chung, Steenburgh, and Sudhir [2014] also explores how alternative compensation systems could benefit/hurt an organization. For example, the study shows that the firm can benefit by shifting from its independent quarterly-quota system to an alternative cumulative quarterly-quota system. The logic is as follows. Suppose that a salesperson has a 300-unit quota for both the first quarter (Q1) and the second quarter (Q2). Under the independent quarterly-quota plan, a salesperson who misses the Q1 quota but achieves the Q2 quota will receive the Q2 bonus. Under the cumulative quarterly-quota system, however, the salesperson needs to make 600 cumulative unit sales (evaluated year-to-date) to receive the Q2 bonus. On the one hand, the cumulative quota benefits the organization by keeping salespeople motivated during periods in which they are showing subpar results. Even if salespeople were to miss the quota in the current period, they know that any sales will eventually help them reach the cumulative quota in later periods. On the other hand, cumulative quotas raise concerns over salespeople's giving-up behavior, as those who are far below the Q1 quota

would give up and no longer put in effort in Q2. On balance, the study's result shows that the positive effect of the former outweighs the negative effect of the latter.

Subsequently, Chung, Kim, and Park [2020] examines the multidimensional outcomes of a change in the sales compensation system. The study considers that salespeople's motivational role may, indeed, not be unidimensional in performance outcomes, but also may affect the attrition behavior of salespeople and, thus, the selection (composition) of the sales force. By analyzing comprehensive data on salespeople's performance, compensation, and attrition, the study reveals that a change in the compensation structure affects the selection of the sales force over time. The study demonstrates a trade-off between fixed and variable compensation. When the firm increases its portion of fixed compensation, employee attrition decreases. Interestingly, however, average sales also decrease. This is due mainly to the retention effect: being granted higher rent, the low-performing salespeople, who would otherwise have left the firm, are now more likely to stay with the firm. In contrast, when a firm increases the portion of variable compensation, average sales increase, but with limited improvement in employee attrition.

4.3 Academic Prescriptions to Practice: What Do We Know Now?

The collaboration between academia and practice has cultivated a number of managerially relevant insights for designing an effective compensation system. **Table 2** summarizes the issues (dilemma) often faced by managers and how the findings in academic research address those issues. For some issues, the research offers a clear prescription: the loss-framing of incentives (i.e., bonus

forfeited when quota is not met) works only in the short run and may backfire in the long run; organizations are generally better off without placing a cap (ceiling) on incentive pay; and supplementing the compensation plan with nonmonetary incentives, such as merchandise, can serve to better motivate salespeople. For most other issues, however, the solution is not as straightforward, and it is necessary to carefully evaluate the various outcomes resulting from the change in the compensation system.

To balance the ratio between fixed and variable compensation, the long-standing guideline is to put greater emphasis on fixed pay when the sales environment is uncertain, when salespeople are risk-averse, and when competitors are offering attractive job opportunities. While this traditional framework still holds, new studies are exploring interesting insights to determine the optimal mix. For example, excessive use of extrinsic incentives may result in unexpected side- effects, as they reduce salespeople's intrinsic motivation. Furthermore, the outcomes associated with fixed and variable pay can be multidimensional and can affect not only performance outcomes, but also employee attrition and the selection of the sales force in the long run.

Organizations also need to consider the underlying heterogeneity in their sales force. They must recognize that, in general, different compensation components (commissions, quota-bonuses, and overachievement rewards) appeal to different types of salespeople. For example, intermediary (e.g., quarterly) bonuses are effective for low-performing salespeople by keeping them on pace to attain their long-term goal; however, long-term (e.g., annual) bonuses and overachievement rewards are effective for high-performing salespeople by keeping them motivated beyond their quotas and

throughout the year. Hence, an effective compensation system, while not overly complicated, typically consists of multiple incentive components, so that it motivates the members of the sales force en masse. Given multiple incentive components, however, salespeople may find ways to game the system. For instance, quota-bonuses may be prone to timing games (i.e., the pushing and pulling sales tactics discussed in Section 3.2). Hence, managers need to be aware of these behaviors and, if necessary, should take appropriate actions to prevent them.

Lastly, managers should carefully set and update quotas. In updating quotas, managers should avoid the practice of ratcheting (updating based on past performance) or, if market potential is still undetermined, keep it as minimal as possible. Although it may be tempting to conclude that the bar is set too low for salespeople who outperform their quota, by ratcheting, the organization is effectively penalizing the top performers—those who may have exerted exceptional effort to reach and surpass their goals. Hence, managers should use objective outside measures, whenever possible, to construct and update salespeople's quotas. The frequency of quotas can also have a significant impact on performance. More-frequent quotas (smaller goals) effectively incentivize low performers and prevent them from giving up in the later periods of an evaluation cycle; however, they can harm the productivity of high performers, as the motivation cue shifts from selling profitable, high-ticket items to selling multiple small, low-ticket products.

Although, thus far, academic research has addressed a variety of topics on sales compensation, much remains to be understood about the diverse behavior of salespeople and ways to better

motivate them. The next section presents prominent areas of future research regarding sales compensation in the midst of rapid sales transformation and technological developments.

5. Future of Sales Compensation

The modern workplace is currently experiencing transformation on a massive scale. Recent advances in information technology, including mobile networking, cloud-based services, smart office, and the Internet and Web of Things, allow connectivity on a real-time basis and alleviate the previous physical barriers. Organizations are becoming increasingly capable of working over a globally distributed network, and the workplace is becoming ever more productive, diverse, and connected, even under remote conditions. As a result, people's work and leisure are overlapping, and workers are developing different styles of communication and collaboration. In sum, the new environment demands increased flexibility, mobility, collaborative work, and real-time communications.

The sales environment cannot be exempt from such transformations. New products and services are proliferating; sales processes are becoming more complex; and customer demand is becoming increasingly volatile and difficult to predict. More than ever, organizations strive to better fulfill the evolving needs and interests of customers—from implementing sales support devices (e.g., mobile devices) for interactive delivery of information and record keeping to AI-driven selling that provides guidance in customer-relationship management.

The ongoing transformation in the sales environment poses both challenges and opportunities when designing an effective sales compensation system. The challenges arise from the rapid transition in the sales environment, which includes changes in the scope of products, restructuring of the sales force, and evolving sales processes. The complexity in the environment makes the link between unobserved effort and performance outcome even more obscure.

Fortunately, the flow of massive data, supported by the recent developments in information technology, can convert these challenges into new opportunities. Furthermore, recent developments in AI systems equipped with ML algorithms facilitate the processing of big data, which helps organizations understand customer demand at an unprecedented level of accuracy and granularity. The following subsections present the key topics arising from each area mentioned above and suggest prominent areas for future research that can help organizations to better motivate and compensate their sales force.

5.1 Sales Transformation

Recent advances in information technology and the shift in environmental factors have rapidly transformed the sales environment. The three primary areas of evolution that are likely to have a profound impact on sales compensation design are: products/services; sales force structure; and sales processes.

Products and Services. In the traditional sales environment, the products that salespeople sold were relatively tangible and self-contained. Sales techniques, therefore, depended significantly on

product knowledge and related services (e.g., functionality and core technical details), in addition to the soft, interpersonal skills of the salesperson. Typically, customers recognized and understood their own needs, and, thus, a salesperson's primary role was to persuade customers that his or her products and/or services suited their needs better than those of the competitors.

While the traditional single-product offerings still exist, comprehensive product offerings have emerged in the past few decades. An example is the rise of solution-based selling, which combines multiple products and features into a comprehensive package. Different from product bundling, which merely provides a convenient, one-stop purchase for customers, solution-based selling builds on the core functionality (e.g., office printing) and synergizes by combining complementary products and services (e.g., web documentation, maintenance, networking, and systems consulting). Salespeople are increasingly carrying a portfolio of solutions rather than multiple independent products, with different combinations of products and services tailored to the diverse needs of customers.

In addition, supported by the new wave of technological innovation, organizations are increasingly promoting the sales of information-based services. The provision of these services comes not only from the software and IT firms, but also increasingly from traditional businesses. Consider Mercedes-Benz, for example, which recently began sales of a fleet-management information system for its truck division. The management tool provides information such as real-time analysis of maintenance (part failures and wear and tear) and driving records (fuel economy and bad habits)

via the cloud. Mercedes-Benz's greater aim over time is to transform its core functionality from a hardware (truck) manufacturer to a software (information management) provider.

The changes in the form of product offerings have also affected how those products are owned and maintained over time. In the past, once a sale occurred, the product would be distributed within the delivery window and serviced according to the terms of the contract. Represented as the Capex (capital expenditure) model, once the sale was closed, the physical ownership of the product was transferred to the customer. Hence, the customer would be responsible for the ownership, maintenance, and management of the product (with potential help from the selling organization).

The emergence of the platform business model and the sharing economy, however, has led to many organizations moving to an Opex (operational expenditure) model, in which products and services are shared, leased, or borrowed from the supplier. Although an Opex model is typically no less costly to run than a Capex model, the advantages over low initial investments and fixed costs, as well as the resulting operational agility, benefit those organizations with such needs. For instance, in the case of business applications and infrastructure, organizations no longer need to physically maintain and operate their own data centers but, rather, run their computing systems on the cloud provider's data center.

These changes in product offerings and physical ownership structure raise important questions about compensating sales agents. One issue is that organizations need to change the performance-outcome measures from product-based to contract- or usage-based (e.g., monthly subscriptions or cloud consumption). These outcome measures call for alternative approaches to motivate and

compensate the sales force, with attention to factors such as long-term profitability, customer acquisition and retention, and operating-cost reduction.

Moreover, the salesperson's effort regarding elaborate products and solutions deserves increased attention. As products become complex and more advanced, the associated role and responsibilities of the sales force and, thus, the selling effort, must also become more sophisticated. Compared to selling discrete products under discrete effort (exerted over the sales process), the new sales environment calls for a more flexible consideration/investigation of the selling effort. For instance, effort can be correlated with continuous product consumption (e.g., promoting greater consumption under usage-based payments) and can vary over time (e.g., acquisition effort vs. continued subscription effort).

Sales Force Structuring. The evolution of mobile connectivity has significantly reduced the physical constraints that arise during the sales process. Reflecting this flexibility, an increasing number of organizations are reshaping how their sales forces are structured: from a product- or geography-based structure to an industry- or (customer-) interest-based structure. Under these structures, the salesperson's territory is no longer bounded by a physical area but is now viewed as a topic-/interest- based area. Hence, the restructuring allows salespeople to focus on a specific type of business and to provide solutions better tailored to the customer's needs, whereas, previously, they simply stayed within the assigned geographical boundary and focused less on their customers' particular needs.

A natural question that arises from having a topic-/interest-based sales territory is how to set an appropriate level of quotas—or, more generally, goals—that will effectively motivate salespeople. Under the traditional structure, organizations had (relatively) straightforward measures: the target market share and/or sales within each product line or geographical area. However, in an industry-based structure, different industries operate with different products, purchase processes, and seasonality. Even more demanding is the interest-based structure, as the market boundary is less clear, and market potential is hard to predict. Poorly set goals often misfire, failing to deliver the expected performance outcome while demoralizing the salespeople in the process. By identifying the right drivers of performance, predicting customer behavior with unprecedented precision, and providing better forecasts of market potential, recent developments in ML methods using big data can be used to address the various challenges faced in setting better goals [Chung et al., 2019]. Therefore, future research calls for increased application of the ML technology to help organizations better manage their goals and their salespeople's quotas.

Another structural change to the sales force—inspired, in part, by limited physical constraints—is an increased preference for inside sales (i.e., sales conducted using digital technology, such as via internet conferencing). Compared to the traditional field sales force, inside sales has the benefit of significantly increasing sales coverage through the use of available digital infrastructure. Inside sales also involve lower operating costs per customer, and, by delegating lower-priority customers to inside sales, existing field salespeople can devote greater energy and attention to high-priority customers.

As the inside sales process typically occurs through a digital infrastructure (rather than face-to-face), sales skills and techniques associated with inside sales differ from those of field sales. Thus, the question of how to effectively incentivize inside salespeople must be addressed. For example, does the rate of fixed vs. variable pay for field sales agents similarly apply to inside agents? Should inside sales agents' compensation be based entirely on outcomes? Should an organization use input measures to incentivize sales agents? If so, what are the appropriate measures? To understand the behavioral role and to better motivate the ever-increasing number of inside salespeople, these questions require attention.

Sales Process. The advances in technology have resulted in more-sophisticated customer and business products. To cope with this rapid development, customers in the B2B sector are advancing the design specification of the products/materials to be purchased from the supplier. Early supplier involvement (ESI) refers to the vertical collaboration between supply-chain partners from the very early stages of customers' product development. Customers in many industries (including automobiles, consumer electronics, and energy, all of which involve a prolonged R&D period) have adopted ESI in order to facilitate seamless development of the end product.

Building such a relationship with customers is a great opportunity for the organization: upon successful R&D by the customer, the product specification locks in to generate long-term profits. However, research has yet to investigate how compensation can incentivize early engagement (i.e., front end of the sales process) with customers. As the outcomes of ESI materialize with uncertainty

in future procurement, the organization should incentivize with available and verifiable measures. Hence, identifying an effective measure, such as one that limits gaming behavior or moral hazard, and deriving an effective compensation system that triggers the right timing of early engagement and optimizes potential can highly benefit an organization.

As products become sophisticated and customers become increasingly knowledgeable, a single salesperson sometimes cannot possess the necessary level of technical knowledge about the product or service. Thus, in order to initiate and close a sale in a highly complicated industry, organizations construct a matrix task force—a cross-functional group of participants from multiple units, such as sales, marketing, engineering, R&D, and manufacturing.

The employees in a matrix task force exert a collective effort, each within his or her own specialty, which leads to a sales outcome. However, each person in the group also has an outcome objective linked to his or her own function (e.g., sales—revenue; marketing—market share; R&D—initial adoption of the product; manufacturing—zero defect), and these objectives may or may not be aligned with the organization's objective. In such an environment, effective alignment of the heterogeneous goals and appropriate assignment of the incentives to each of the participants become critical for successful collaboration. Therefore, examining how to allocate and compensate over a single outcome measure across multiple employees is an important question for organizations to consider.

5.2 Artificial Intelligence and Machine Learning

With advances in information technology, more and more organizations are using elaborate sales management databases and sales support devices (e.g., tablets and mobile devices). The amount of data that organizations are generating is almost doubling each year; this significant amount of data contains meaningful, though unstructured, information on salespeople's behavior, customer preferences, sales processes and prospects, and failed sales attempts, among others. The term *big data* refers to large and complex databases, the large volume of which presents challenges to process using traditional data application techniques. The challenges associated with big data include capturing, storing, analyzing, searching, sharing, transferring, visualizing, querying, and updating the sizable data.

Recent developments in AI systems and ML methods can help overcome these challenges. AI systems attempt to mimic human-level (natural) intelligence using machines and to perform tasks such as problem-solving, decision-making, visual perception, natural language processing, and motion. Among a number of approaches to guide AI, the ML algorithm, by effectively regulating the curse of dimensionality, is becoming increasingly capable of facilitating the analyses of previously unmanageable big data. This breakthrough is allowing organizations to use the sizable data they possess across various topics, including pricing, segmentation, customer relationship management, new-product development, and advertising. Yet organizations have not actively pursued ML methods in the design of their sales compensation practices.

As discussed throughout this monograph, organizations design various compensation systems in an attempt to align the incentives of the sales agent with those of the organization. Because the

organization cannot observe the agent's effort, the resulting moral hazard leads to a suboptimal level of effort necessary for the organization. If the organization could precisely measure an agent's effort, such concerns would pose less of a problem. Applying the ML methods to sales compensation can help organizations take a step closer to measuring the true level of effort—necessary to arrive near the first-best outcome. The massive amount of information collected qualitatively during the sales process and kept in the databases of organizations will shed light on identifying the true behavioral motives of salespeople.

AI and ML can affect sales compensation largely along three dimensions: (1) sales response function estimation; (2) behavior- and activity-based compensation; and (3) measurement of customers' non-verbal and verbal responses. The use of ML methods to recover an agent's objective behavior will potentially have a major influence on future sales research; it can also aid organizations in designing effective compensation systems and, thus, in better motivating their sales force.

Sales Response Function. In order to properly design a sales compensation system, one needs a good understanding of the sales response function. Specifically, managers are interested in how a salesperson's effort affects his or her performance and the organization's desired outcome. However, effort is a highly multidimensional (and theoretical) construct that includes all of the various activities that the sales agent performs to enhance the probability of a sale.

In the past, due to challenges in obtaining and processing the granular level of data, studies were limited to analyzing easily quantifiable metrics, such as the number of calls made and hours

spent in the field, to proxy for selling effort. However, in practice, salespeople engage in multidimensional activities that are likely to affect the final sales outcome. For instance, salespeople conduct a number of pre-call preparations, such as telephone and email conversations, webinars, and video conferences, to build general interest and to persuade potential customers, even before they make a first physical visit. ML methods allow organizations to capture the various activities (both quantitative and qualitative) and incorporate them into the sales response function. Facilitated by the ML technology, incorporating the qualitative sales data would lead to a much richer specification of the sales response function; thus, it would help managers understand which aspects of agents' multidimensional effort the organization should emphasize in its compensation system.

ML algorithms have been shown to estimate response functions in other domains with great accuracy. For example, Bajari et al. [2015] documents how applying ML techniques can outperform traditional methods for demand estimation. Specifically, the study compares the performance of ML and traditional methods using the same dataset and the same covariates to support its claims. Furthermore, given that ML methods can handle highly complex, unstructured data of the type that traditional methods cannot handle, ML methods are likely to yield even greater advantages than those documented in Bajari et al. [2015].

Behavior-Based Compensation. Regarding performance measures used for compensation purposes, outcome measures are common because of the ease of tractability and administrative

efficiency. However, the use of behavioral measures in a compensation system, if properly administered, can enhance salespeople's qualitative behavior toward achieving the organization's desired objectives. Thus far, application of behavioral measures has been limited due to the excessive costs associated with monitoring salespeople's behavior with precision and due to concerns about their explicit manipulation of behavioral input.

When an organization wants its salespeople to act in a manner consistent with higher-level, strategic organization goals (beyond just greater sales volume), then a behavior-based compensation system is warranted [Anderson and Oliver, 1987]. The behavior-based control requires the measurement of more-complex aspects of the salesperson's job, including (1) what the salesperson brings to the selling task (e.g., aptitude, product knowledge); (2) his or her activities; and (3) his or her sales strategies.

To the extent that control and compensation systems are often intertwined, a behavior-based control system will also impact the design of the compensation system. As discussed, the rapidly increasing popularity of inside sales gives organizations access to activity-level and salesperson behavior-level data across the entire sales process. AI systems equipped with ML methods can capture and analyze all of the activities that salespeople perform during all stages of the sales process, and one can build a predictive model of win probabilities based on these activities [Yan et al., 2015]. An organization can develop a behavior-based compensation system on the activities or combination of activities that are more predictive of ultimate success, as measured by win probabilities.

Measuring Qualitative Interactions. A big benefit of the ML method is that it can handle *qualitative data* (e.g., texts, pictures, speech and voice data), which frequently arise during various steps of the sales process. These data, due to their highly unstructured nature, do not lend themselves to analysis with established statistical and econometric methods. ML methods transform unstructured data into a structured form, which embeds valuable information for further analyses. For instance, Microsoft's Azure AI engine, by feeding in historical speech and voice data, provides guidance to its inside sales force on qualitative approaches, such as whom and when to call, what to say, and how to handle objections.

The sales profession has historically been interested in uncovering cues about better salesperson-customer interactions. The logic is that better interactions will make salespeople more persuasive in influencing customer preferences and behavior. Toward this goal, an important factor is understanding customers' verbal and non-verbal cues when they interact with salespeople. It is noteworthy that even in the earliest days of sales research, there were attempts to scientifically study how customers' non-verbal cues serve as a predictor for the quality of a sales encounter. For example, Chapple and Gordon Jr. [1947] addresses non-verbal cues, including facial expressions, gestures, and different aspects of speech, to understand customer interactions. ML methods have the potential to be a game changer in the quest to better understand customers' reactions to sales contacts initiated by salespeople via multiple channels. Once an organization understands the customer's behaviors that are predictive of a final sale, as well as the salesperson's actions that elicit

such behaviors from the customer, it can design *smart* compensation systems to incentivize these actions.

6. Conclusion

The design of a sales compensation system is a complex task with multi-dimensional outcomes. An effective system has a clearly defined objective and provides adequate incentives to align that objective with salespeople's behavior. The challenge in motivating salespeople arises because an organization cannot observe their behavior. Hence, the effectiveness of a system hinges on how properly the organization rewards a salesperson for his or her efforts. Academic research on sales compensation has attempted to identify an optimal compensation system that mutually benefits the sales agent and the firm.

This monograph focuses on delivering insights into (1) the current state of research regarding sales compensation and its practical relevance; and (2) future research agendas in this area. The review of sales compensation studies, from both theoretical and empirical standpoints, provides a core summary of what "we know" at the moment. The theoretical studies, building on the principal-agent theory, provide a useful lens through which to view factors that determine the ratio between fixed and variable compensation. The empirical studies, including field experiments and structural econometric methods, attempt to evaluate the role of various contextual factors in the design of an effective sales compensation system.

Recent developments in technology have brought various changes to the sales environment and sales strategy formulation, thus affecting the ways in which organizations design compensation systems. Amidst the complexity and volatility of the changing environment, an organization's use of AI systems provides new opportunities for academic research. This monograph suggests several promising areas of future research and examines how the application of AI can help organizations better motivate and compensate their salespeople.

In summary, this monograph presents the evolution of research in sales compensation, with a focus on connecting the academic findings with practice so that the created knowledge can benefit organizations worldwide. In addition, the monograph establishes research agendas associated with the use of AI in designing an effective sales compensation system that can offer practical guidance to organizations. Incentives, arguably, are the main driver of economic prosperity in a capitalist society. Organizations obtain greater output and employees enjoy higher income with an effective compensation system, thus benefiting society at large. Hence, finding the right compensation system is important not only in the area of sales, but also in the broader society.

References

Albers, S. and M. K. Mantrala (2008), "Models for sales management decisions". In *Handbook of marketing decision models* (pp. 163-210). Springer, Boston, MA.

Anderson, E. and R. L. Oliver (1987), "Perspectives on behavior-based versus outcome-based salesforce control systems". *Journal of Marketing* 51(4), 76-88.

Bajari, P., D. Nekipelov, S. P. Ryan and M. Yang (2015), "Machine Learning Methods for Demand Estimation," *The American Economic Review*,105(5), 481-485

Basu, A. K., R. Lal, V. Srinivasan, and R. Staelin (1985), "Salesforce compensation plans: An agency theoretic perspective". *Marketing science* 4(4), 267-291.

Chan, T. Y., J. Li, and L. Pierce (2014). "Compensation and peer effects in competing sales teams". *Management Science* 60(8), 1965-1984.

Chapple, E., and Gordon, D., Jr. (1947), "An evaluation of department store salespeople by the interaction chronograph," *Journal of Marketing*, 173–185.

Chung, D. J. (2015), "How to really motivate salespeople". *Harvard Business Review* (April 15), https://hbr.org/2015/04/how-to-really-motivate-salespeople.

Chung, D. J., I. Huber, V. Murthy, V. Sunku, and M. Weber (2019), "Setting Better Sales Goals with Analytics". *Harvard Business Review* (website) (July 19), https://hbr.org/2019/07/setting-better-sales-goals-with-analytics.

Chung, D. J., B. Kim, and B. G. Park (2020), "The Comprehensive Effects of Sales Force Management: A Dynamic Structural Analysis of Selection, Compensation, and Training". Working paper, Harvard University.

Chung, D. J. and D. Narayandas (2017), "Incentives versus reciprocity: insights from a field experiment". *Journal of Marketing Research* 54(4), 511-524.

Chung, D. J., D. Narayandas, and D. Chang (2020), "The Effects of Quota Frequency: Sales Performance and Product Forms". *Management Science*, Forthcoming.

Chung, D. J., T. Steenburgh, and K. Sudhir (2014), "Do bonuses enhance sales productivity? A dynamic structural analysis of bonus-based compensation plans". *Marketing Science* 33(2), 165-187.

Churchill Jr, G. A., N. M. Ford, S. W. Hartley, and O. C. Walker Jr (1985), "The determinants of salesperson performance: A meta-analysis". *Journal of Marketing Research* 22(2), 103-118.

Coughlan, A. T. and K. Joseph (2012), "Sales force compensation: research insights and research potential". In *Handbook on business to business marketing* (pp. 473-495). Edward Elgar Publishing, Inc., Cheltenham, UK.

Coughlan, A. T. and C. Narasimhan (1992), "An empirical analysis of sales-force compensation plans". *Journal of Business* 65(1), 93-121.

Coughlan, A. T. and S. K. Sen (1989), "Salesforce compensation: Theory and managerial implications". *Marketing Science* 8(4), 324-342.

Farley, J. U. (1964), "An optimal plan for salesmen's compensation". *Journal of Marketing Research* 1(2), 39-43.

Grossman, S. J. and O. D. Hart (1983), "An Analysis of the Principal-Agent Problem". *Econometrica* 51(1), 7-46.

Harris, M. and A. Raviv (1979), "Optimal incentive contracts with imperfect information". *Journal of Economic Theory* 20(2), 231-259.

Holmström, B. (1979), "Moral hazard and observability". *Bell Journal of Economics* 10(1), 74-91.

Holmström, B. and P. Milgrom (1987), "Aggregation and linearity in the provision of intertemporal incentives". *Econometrica: Journal of the Econometric Society* 55(2), 303-328.

Huang, S., L. Jin, and Y. Zhang (2017), "Step by step: Sub-goals as a source of motivation". *Organizational Behavior and Human Decision Processes* 141(2017), 1-15.

Hull, C. L. (1932), "The goal-gradient hypothesis and maze learning". *Psychological Review* 39(1), 25-43.

Hull, C. L. (1938), "The goal-gradient hypothesis applied to some "Field-Force" problems in the behavior of young children". *Psychological Review* 45(4), 271-298.

John, G. and B. Weitz (1989), "Salesforce compensation: An empirical investigation of factors related to use of salary versus incentive compensation". *Journal of Marketing Research* 26(1), 1-14.

Joseph K., M. U. Kalwani (1998), "The role of bonus pay in salesforce compensation plans". *Industrial Marketing Management* 27(2), 147-159.

Kishore, S., R. S. Rao, O. Narasimhan, and G. John (2013), "Bonuses versus commissions: A field study". *Journal of Marketing Research* 50(3), 317-333.

Lal, R., D. Outland, and R. Staelin (1994), "Salesforce compensation plans: an individual-level analysis". *Marketing Letters* 5(2), 117-130.

Lal, R. and V. Srinivasan (1993), "Compensation plans for single-and multi-product salesforces: An application of the Holmstrom-Milgrom model". *Management Science* 39(7), 777-793.

Lal, R. and R. Staelin (1986), "Salesforce compensation plans in environments with asymmetric information". *Marketing science* 5(3), 179-198.

Lepper, M. R., D. Greene, and R. E. Nisbett (1973), "Undermining children's intrinsic interest with extrinsic reward: A test of the "overjustification" hypothesis". *Journal of Personality and Social Psychology* 28(1), 129-137.

Lim, N., M. J. Ahearne, and S. H. Ham (2009). "Designing sales contests: Does the prize structure matter?". *Journal of Marketing Research* 46(3), 356-371.

MAGNA (2018) MAGNA Advertising Forecasts. Available at https://magnaglobal.com/magna-advertising-forecasts-winter-2018-update (2020/1/21).

Mantrala, M. K. (2014) Sales force productivity models. In R. S. Winer and S. A. Neslin (Eds.). *The history of marketing science* (pp.427-462). New York, NY: World Scientific.

Mantrala, M. K., S. Albers, F. Caldieraro, O. Jensen, K. Joseph, M. Krafft, C. Narasimhan, S. Gopalakrishna, A. Zoltners, R. Lal, and L. Lodish (2010), "Sales force modeling: State of the field and research agenda". *Marketing Letters* 21(3), 255-272.

Mirrlees, J. (1999), "The Theory of Moral Hazard and Unobservable Behaviour: Part I". *Review of Economic Studies* 66(1), 3-21.

Misra, S., A. T. Coughlan, and C. Narasimhan (2005), "Salesforce compensation: An analytical and empirical examination of the agency theoretic approach". *Quantitative Marketing and Economics* 3(1), 5-39.

Misra, S. and H. S. Nair (2011), "A structural model of sales-force compensation dynamics: Estimation and field implementation". *Quantitative Marketing and Economics* 9(3), 211-257.

Oyer, P. (2000), "A theory of sales quotas with limited liability and rent sharing". *Journal of labor Economics* 18(3), 405-426.

Powers, T. L., W.S. Martin, H. Rushing, and S. Daniels (1987), "Selling before 1900: A historical perspective". *Journal of Personal Selling & Sales Management* 7(3), 1-7.

Raju, J. S. and V. Srinivasan (1996), "Quota-based compensation plans for multiterritory heterogeneous salesforces". *Management Science* 42(10), 1454-1462.

Rao, R. C. (1990), "Compensating heterogeneous salesforces: Some explicit solutions". *Marketing Science* 9(4), 319-341.

Richardson, R. (1999), "Measuring the impact of turnover on sales". *The Journal of Personal Selling & Sales Management* 19(4), 53-66.

Rouziès, D. and V. Onyemah (2018), "Sales Force Compensation: Trends and Research Opportunities". *Foundations and Trends in Marketing* 11(3), 143-214.

Schöttner, A. (2016), "Optimal sales force compensation in dynamic settings: Commissions vs. bonuses". *Management Science* 63(5), 1529-1544.

Selling Power (2019), Selling Power 500 Largest Sales Forces. Available at https://www.sellingpower.com/resources/2019/selling-power-500 (2020/1/21).

Steenburgh, T. J. (2008), "Effort or timing: The effect of lump-sum bonuses". *Quantitative Marketing and Economics* 6(3), 235.

U.S. Department of Labor, Bureau of Labor Statistics (2018), *National Occupational Employment and Wage Estimates*, May.

Viswanathan, M., X. Li, G. John, and O. Narasimhan (2018), "Is cash king for sales compensation plans? Evidence from a large-scale field intervention". *Journal of Marketing Research* 55(3), 368-381.

Weinberg, C. B. (1975), "An optimal commission plan for salesmen's control over price". *Management Science* 21(8), 937-943.

Weinberg, C. B. (1978), "Jointly optimal sales commissions for nonincome maximizing sales forces". *Management Science* 24(12), 1252-1258.

Yan, J., C. Zhang, H. Zha, M. Gong, C. Sun, J. Huang, S. Chu, X. Yang (2015), "On Machine Learning towards Predictive Sales Pipeline Analytics," *Proceedings of the Twenty-Ninth AAAI Conference on Artificial Intelligence*, Association for the Advancement of Artificial Intelligence

Zoltners, A. A., P. Sinha, and S. E. Lorimer (2012), "Breaking the sales force incentive addiction: A balanced approach to sales force effectiveness". *Journal of Personal Selling & Sales Management* 32(2), 171-186.

Zoltners, A. A., P. Sinha, and S. E. Lorimer (2013), "Are you paying enough attention to your sales force?". *Harvard Business Review* (April 12), https://hbr.org/2013/04/are-you-paying-enough-attention-to.

Table 1: Summary of Comparative Statics in Basu et al. [1985]

Effect of Increase In:	Effect on Optimal					
	Firm Profit	Agent's Effort	Salary Level	Commission Rate	Agent's Expected Income	Salary/Expected Income
Uncertainty	(−)	(−)	(+)	(−)	(−)	(+)
Marginal cost of production	(−)	(−)	(+)	(−)	(−)	(+)
Agent's outside option	(−)	(−)	(+)	(−)	(+)	(+)
Effectiveness of sales effort	(+)	(+)	Uncertain	Uncertain	Uncertain	Uncertain
Baseline sales level	(+)	Uncertain	Uncertain	Uncertain	Uncertain	Uncertain

Notes. Adapted from Basu et al. [1985]. The study's results are derived using both gamma and binomial distributions; only the robust outcomes are reported in this table.

Table 2: What We Know Now: Academic Prescriptions on Managerial Issues

Managerial Issues	Academic Findings	Relevant Studies
Balancing fixed (salary) vs. variable (incentives) mix	More weight should be put on salary when: - Sales environment is uncertain. - Salespeople are risk-averse. - Salespeople possess good outside options.	Basu et al. [1985], Lal and Srinivasan [1993], Coughlan and Narasimhan [1992]
	Aggressive use of incentives (conditional on performance) may demotivate salespeople in the long run, as extrinsic incentives drive away intrinsic motivation.	Chung and Narayandas [2017]
	Fixed and variable pay affect not only performance, but also employee attrition and, thus, the selection of the sales force in the long run. - Fixed pay: improves employee attrition at the cost of productivity—due to the retention effect.	Chung, Kim, and Park [2020]

	- Variable pay: increases productivity but limited improvement in employee attrition.	
Deciding on the incentive components: commissions, quota-bonuses, and overachievement rewards	Different incentive components (commissions, quota-bonuses, and overachievement rewards) appeal to different types of salespeople. - Commissions uniformly motivate all types of salespeople. - Intermediary (e.g., quarterly) bonuses are effective for low-performing salespeople. - Long-term (e.g., annual) bonuses and overachievement rewards are effective for high-performing salespeople.	Chung, Steenburgh, and Sudhir [2014]
	Quota-bonus plans may induce timing games by salespeople—which, however, can be mitigated through effective monitoring.	Steenburgh [2008], Kishore et al. [2013]
Setting quotas (goals)	The practice of ratcheting quotas (updating quotas based on past performance) negatively affects motivation.	Misra and Nair [2011]
	More-frequent quotas (granular goals): - Increase productivity of low-performing salespeople by preventing them from giving up early in the quota cycle. - Decrease productivity of high-performing salespeople, as their focus shifts toward low-ticket products.	Chung, Narayandas, and Chang [2020]
Framing of incentives	Loss-framing of incentives (i.e., forfeited if quota is not attained) works only in the short run and not effective in the long run.	Chung and Narayandas [2017]
Imposing a cap on incentives	A cap (ceiling) on incentive pay demotivates salespeople.	Misra and Nair [2011]
Utilizing nonmonetary compensation	Supplementing compensation with nonmonetary components (e.g., merchandise) may better motivate salespeople.	Viswanathan et al. [2018]

Figure 1: How to Design a Sales Compensation System

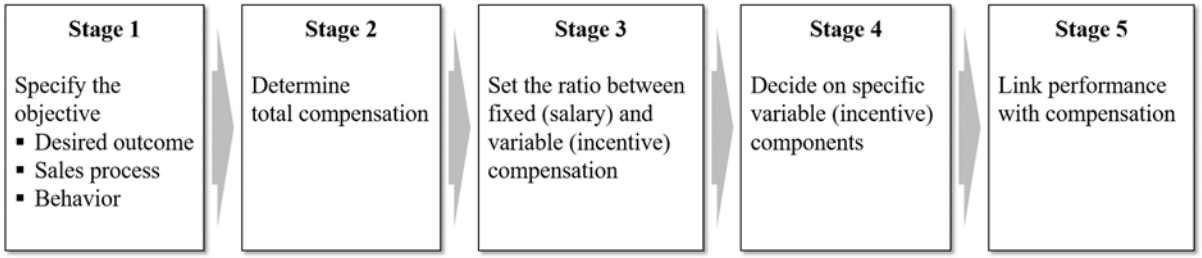

Figure 2: Types of Incentive Compensation Schemes