Franchise management: a model of service-quality interactions

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Abstract *The main research question addressed in this paper is how two independent retail outlets in a franchise chain would react to each other on the quality of services. To better explain the interaction, the franchise as an organizational form and its peculiar characteristics compared to the integrated firm on the one hand and market transactions on the other hand are initially discussed. The paper then proposes a theoretical model of the "free-riding phenomenon" related to the quality of services in the franchise chain, and interactions on the quality of services between the independent outlets in different environments. As spill-over exists, two franchisees start to react to each other's quality of services and they increase the quality as the positive spill-over effect becomes significant. The equilibrium with spill-over gets close to that without spill-over, as the spill-over effect approaches zero.*

Introduction: franchise as an organization

In industrial organization theory, an organization is conceptualized as a nexus of contracts, treaties, and understandings among its individual members (Alchian and Demsetz, 1972). The most fundamental unit of analysis in an economic organization is the "transaction" – the transfer of goods or services from one member to another (Milgrom and Roberts, 1992). According to Coase (1937), there exist two types of transactions: one made within firms, and the other between firms. To bridge the sharp distinction between intra-firm and inter-firm transactions, markets allow various hybrid organizational forms having an optimal blend of the two types. The franchise organization is one of these hybrid forms. Franchising is an organizational form chosen by management in order to compete in industries in the retail trade and services sectors that require highly decentralized operations at a chain of multiple sites (Michael, 2000). Transactions between the franchisor and the franchisee are similar to those between two independent firms (market transactions) in legal aspect. However, under the formal franchise contract, the franchisor has most of the management control (even when the contract is not complete) over the behavior of the franchisee. The relationship between the franchisor and the franchisee is almost the same as that between a firm and an employee under incomplete contract (Rubin, 1978). Franchise chains account for between one-third and two-thirds of total sales in retail trade and service industries where

they compete, e.g. hotels, motels, restaurants, car rentals, fast food, specialty retailing, auto repair, copy shops, etc. (Michael, 1996).

To explain the evolution of the franchise organization, which expands its chain with the notion of mixed ownership, one can apply theories with regard to risk sharing, capital raising, and monitoring and control aspects. In pure risk sharing models, both parties (franchisor and franchisee) are assumed to be risk averse. They, therefore, derive benefit by signing a contract of revenue sharing through the franchise arrangement (Stiglitz, 1974; Martin, 1988). Capital raising is the other traditional explanation for franchising despite its assumption of the imperfect capital market. The logic of chain expansion based on franchising instead of creating own subsidiaries lies in the difficulty of raising capital by the franchisor alone (Oxenfeld and Kelly, 1969; Ozanne and Hunt, 1971; Caves and Murphy, 1976). More recently, monitoring and control aspect is considered as the most eclectic approach, which explains the reason of mixed ownership structure of the franchise from the point of view of minimizing transaction costs. It gives analytic explanation of the role of certain contract clause such as royalty, related to monitoring and control aspect (Brickley and Dark, 1987; Lafontaine 1992).

The organizational form of franchising has been shown to yield higher profits and faster growth through reducing agency costs (Michael, 2000). The franchise contract is a bilateral agreement between a franchisor and a franchisee, which gives the franchisee the right of receiving most of residual revenues coming from operating a given outlet under the franchisor's instructions or guidelines on outlet management. It typically includes standardized clauses on managerial assistance, price, hours of operation, inventory management, royalty payment, and contract termination (Ozanne and Hunt, 1971). In general, franchising takes two distinct forms: product franchising, where a manufacturer creates a contractual channel of distribution for one or more of its products; and business format franchising, where a retailer licenses the right to replicate its business concept in another location. In either case, the manufacturer's or retailer's decision to franchise is derived from its desire to distribute its trademarked product or service concept more broadly (Lafontaine, 1992).

The revenue of the franchisor and the franchisee depends mainly on local outlet sales. The franchisee pays sales royalty to the franchisor in proportion to the sales of franchised outlets (typically ranging between 1 and 10 percent). He also pays royalty for marketing expenses (from 0 to 6 percent) to the franchisor. In addition to royalty, a franchise fee is paid upfront by the franchisee and is related to the market value of a new outlet, which depends largely on the performance of existing outlets and the location of the chosen outlet. The franchisee then receives, for that particular site, the stream of profits after all expenses, including royalties, have been paid (Michael, 1999). In general, the franchisee faces a demand of his products or services as a function of variables such as his price, quality of services, marketing effort, and competitive situation. Among these, price is often fixed by the franchisor with a resale price

maintenance[1] policy or a range of price recommended by the franchisor. The competition level is also out of the control of the franchisee (except the possibility of change in market situation by the franchisee's own action, e.g. one franchisee's frequent promotion may change the market situation with regard to his competitors). Consequently the franchisee has a possibility to maximize his profit with two variables: the quality of services and the marketing effort, which, of course, implies additional costs for the management. The marketing effort often influences only the local demand faced by a franchisee. There is little consequence on the global brand image because most of marketing efforts based on promotions of various forms (e.g. free coupon, frequent customer discount, etc.) are local in nature. On the contrary, the quality of service influences the local demand as well as the global brand image, which in turn influences the local demand of all outlets of the chain.

The global brand image of a company consists of various dimensions such as product attribute, intangibles, customer benefits, price, use/application, user celebrity, lifestyle, product class, competitors, and country of origin (Aaker, 1991). As these dimensions change, the brand image evolves along with time. In its evolutionary process, the quality of services[2] plays an important role, because customer's satisfaction with the service experience is self-reinforcing and generates word-of-mouth to influence the perception of image of the brand.

In the franchise system, the franchisor wants to increase the sales of outlets of the chain, a mixture of owned and franchised outlets, without degrading the image of the franchise. But, the franchisee is the residual claimant – he invests his own capital and receives residual claims from his specific site operation rather than a salary. He is often tempted to reduce the level of his quality of services (free-ride) in order to increase his short- and/or long-term profit. Because of the incompleteness of the contract, the franchisor cannot include all necessary provisions preventing the franchisee from free-riding (Brickley and Dark, 1987). Extant research has raised the issue of the optimal monitoring related to free-riding problem:

- monitoring depends on outlet size, demand volatility, and competition (Gal-Or, 1995)[3]; and
- the negative correlation between monitoring costs and service level.

Probably the best example of monitoring and control aspects of a franchise chain is the McDonald's fast food chain. A world-class franchise process executor, McDonald's operates more than 21,000 franchised retail outlets in about 100 markets (Lentz and Setrakian, 1997). The fast food giant leaves little to chance in the operation of individual franchised outlets. All the operating processes of the franchise chain support the core brand elements: quality, service, cleanliness, value (QSCV). The franchisor maintains a highly rigoros procedure for franchisee selection and training. Location selection is

analytically driven and confirmed with deep market knowledge. Facility design is tightly controlled and quality is ensured through centralized responsibility for service design (Lentz and Setrakian, 1997). Table I describes the franchising policies of the fast food chain, McDonald's, as an illustration of service standardization across the chain.

Ownership aspect of the franchise

Whether to franchise or to own the retail outlets is still a challenging decision in franchise chain management because the empirical findings on this decision do not correspond perfectly to the theoretical predictions of the phenomenon. Lafontaine and Slade (1997) provide a comprehensive summary of previous research related to the ownership decision. It analyzes the correlation between selected variables and ownership. For example, the classical principal-agent theory explains that if there is more risk or uncertainty in a given outlet, it is better for the franchisor to run it directly instead of franchising it. Contrary to these theoretical predictions, previous empirical research shows that there is a

Process	Overview	Highlights
Site selection	Systematic approach supported by inhouse real estate group	Modeling algorithm of site success Owns 60 percent of all land Controls 100 percent where permitted
Facility strength	International "look and feel"	600-800 sites reconstructed/year to upgrade McDonald's designs, builds all sites Investment flows through in rent
Operation/retailer support	Extreme standardization of practices; "QSCV"[a] retail concept reiterated worldwide; rigoros standards and enforcement	Franchisee recruiting – 20,000 applicants to 200 selected 2,000 hours of unpaid on-site training 800-page operating manual Franchisee selection – only-business, full-time operator, liquid net worth >$175,000 Specific standards, rigid inspections, repercussions for poor performance
Brand image	Global brand focus with consistent image advertising supported by strong community involvement	6 percent of sales with 4 percent from franchisees spent on advertising Global, regional, local and community ad spend levels Ad spending per store $100,000

Table I.
The franchising policies of McDonald's

Note: [a] QSCV = quality, service, cleanliness, value
Source: Lentz and Setrakian (1997)

negative correlation between these facts. The major variables in franchising decision and their relationship to the existence of company-owned outlet are discussed in Table II.

In a formal model of the costs and benefits of integration of assets, Hart (1995) explains that the optimal ownership structure depends on the elasticity of investment, the productivity of investment, the independence of assets, the complementary assets, and the specificity of human capital. The franchisee seeks the trademark, the franchisor's management (training) support (Hough, 1986), and lower development costs (Peterson and Dant, 1990).

Complementary to perspectives presented earlier, Kaufmann and Stanworth (1995) show that the decision to become a franchisee has both economic and social determinants: the prior employment experience and family employment goal. These factors influence not only the decision to become a franchisee, but also what features of franchising are most attractive. They proved the positive relation between prior self-employment experience and purchasing a franchise, which goes against Williams' (1994) prediction, i.e. the probability of becoming a franchisee was lower for entrepreneurs with prior business ownership experience than for those without such experience. The existence of this empirical counter evidence points to the need for more theoretical analysis and modeling of ownership issues (in terms of dimensions like risk, competition and human capital) and service quality in franchise chains.

The quality of services

Delivering service quality is universally recognized as a sustainable competitive advantage in today's competitive marketplace (Buzzell and Gale, 1987; Reichheld and Sasser, 1990; Lewis, 1993a, b). During the 1980s, service researchers focused on determining what the quality of services meant to customers (customers' perceived services) and developing strategies to meet customer expectation. The most commonly used definition of service quality is the extent to which services meet customers' needs and requirements and how well they match or exceed customer expectations (Lewis, 1993a; Behara and Gundersen, 2001). Parasuraman *et al.* (1985) developed a framework explaining

Variable	Theoretical prediction on ownership decision	Prior empirical finding	
Risk and uncertainty	Positive	Negative	
Monitoring difficulty			
by performance	Positive	Positive	
by effort	Negative	Negative	
Agent's effort	Negative	Negative	**Table II.**
Outlet size	Negative	Positive	Prediction and
Substitutability	Negative	Negative	findings from
Source: Lafontaine and Slade (1997)			literature

the link between service performance and consumer's behavioral intention and this model was later validated by authors and extended to consumer's behavior reaction (Cronin and Taylor, 1992). Lewis (1993a) provides a critical review of different approaches to service quality measurement. The framework is presented in Figure 1.

The financial impact of the quality of services subsequently became a hot issue to justify managers' interests to invest in service quality improvement programs. The issue of quality costs is central to the debate on the financial impact of the quality of services. In their pioneering research, Dale and Plunkett (1991) noted that knowledge of quality costs could help managers to justify the investment in quality improvement and assist them in monitoring the effectiveness of the efforts made. The relationship between retention and profits has been verified by a number of researchers (Fornell and Wernerfelt, 1987; Reichheld and Sasser, 1990; Anderson and Sullivan, 1993; Rust and Zahorik, 1993) and the impact analyzed in two extreme cases: customer defection and retention. Furthermore, this stream advances in detail by distinguishing customer's satisfaction level (comparison between satisfied and delighted customer classes) with regard to retention rate (Jones and Sasser, 1995; Narayandas, 1996).

The issue of the quality of services is central to franchise business, because business format franchising, which includes not only the product, service, and trademark, but also the entire business format, is a growing phenomenon. Moreover, even in product franchising, the service offered by the franchisee plays a major role on its sales. It draws the attention to the quality of services as a weapon of competition. Michael (2000) argues that the diffuse residual claims of the franchise system reduce overall system quality and this problem is inherent in the very nature of franchising. Theory suggests that franchised chains spend less on service quality than company-owned chains because of spill-over effects. Service quality employed by one unit spills over to have a positive impact on sales in other units through the shared trademark. This spill-over is ignored by each franchisee because it does not affect individual profits, so franchisees spend less on service quality; but a company-owned chain captures the spill-overs and spends more on service quality. Based on an empirical survey, Michael (2000) demonstrated that quality in franchised chains is negatively related to the percent franchising in the chain, controlling for size, growth in units, monitoring costs, market segment, ownership structure, multi-chain operation, and price. Therefore, more effort is needed on

Figure 1.
Service-quality
framework
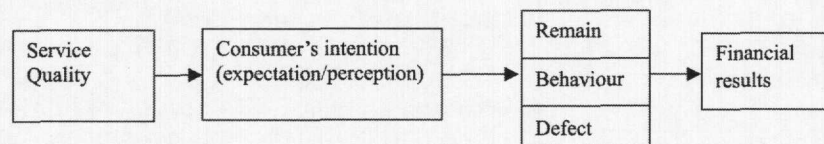
the part of the franchisor to prevent the chain members from free-riding on the quality of services.

The research problem
As discussed above, the franchise arrangement enjoys unique characteristics that straddle between intra-firm and market transactions. A challenging issue in this context is the free-riding phenomenon in franchise chain. Free-riding happens frequently in the situation where the agent does not get a full benefit of his effort (low-powered contract). Even in high-powered franchise contract, the franchisee attempts to free-ride *vis-à-vis* other outlets in the chain. Thus, the principal objective of this paper is to develop a model of service quality interactions between outlets in franchise chains, incorporating the franchisee's incentives to free-ride. This has been explained in terms of three dimensions: risk, competition, and human capital.

Free-riding phenomenon
Free-riding phenomenon is observed in cases where many people have the right to use a single shared resource. There is an incentive for the resource to be overused. Correspondingly, free-riding happens also when many people share the obligation to provide some resources. Franchisees operating under a common brand create an agency problem. The franchise contract increases free-riding and decreases quality in decentralized service chains (Michael, 2000). Quality is not contractible in this setting. If a franchisee invests in a higher level of service quality, there will be a spill-over benefit to other franchisees through the shared brand. Because benefits of an investment are shared, each franchisee would like to avoid making investment and free ride on the other franchisees' investments (Michael, 1999). Therefore, in this case, there is an incentive for brand-level service quality to be undersupplied (Milgrom and Roberts, 1992). In the franchise chain, the quality of services of each outlet contributes largely to maintaining and improving the brand image of the chain through retaining customers and stimulating word of mouth. On the other hand, to offer a certain quality of services, each outlet should make effort that requires supplementary costs. In view of these apparently contradictory facts, the franchisee is frequently tempted to deliver a lower quality of services than needed in order to raise his own short and/or long term profit.

Externalities and free-riding
Externalities are positive or negative effects that one economic agent's actions have on another's welfare that are not regulated by the systems of prices (Milgrom and Roberts, 1992). It happens when decision makers are not taking full account of all the costs and benefits associated with their choices. In franchise, positive externalities exist on the quality of services. It means that one outlet's quality of services influences the sales of another through transfer of brand image. Therefore an outlet (franchised) may free-ride on others' efforts

by decreasing its quality of services. For the franchisor, this implies double trouble. At first, the quality of services provided by franchisees should be inferior to the global optimal level due to externalities. If the franchised outlet does not take into account the positive externalities on his neighboring outlets, his service quality level will be optimal for him, but not optimal for the whole franchise chain (inferior to the global optimal level reflecting over positive externalities among members of the chain). If the whole chain is managed by the franchisor himself, he will choose the global optimal level of the quality of services that incorporates externalities of service among outlets in the franchise chain. Moreover some of them may try to free-ride, which enforces the necessity of monitoring the chain members.

Incentives to free-ride on the quality of services

Monitoring and free-riding incentive are two faces of a coin. The more there are incentives for agents to free-ride, the more the franchisor finds the necessity to monitor them. Much of previous research identifies monitoring as a major factor of ownership structure decision. They distinguish monitoring agent's performance and effort by its difficulty. The former is positively related to vertical integration (company owned outlet) and the latter negatively related (Lafontaine and Slade, 1997). Surprisingly very little attention has been paid to the free-riding problem (Brickley and Dark, 1987; Brickley et al., 1991; Minkler, 1990). Neither theoretic nor empirical research has been significantly pursued to analyze this problem. Lafontaine and Slade (1997) suggest that the lack of strong evidence in favor of free-riding is because the franchisor may find ways to control franchisee behavior. But, the strongest argument for advancing research on free-riding incentives is that their explanation is contradictory. The fact that the franchisor needs to monitor the franchisee means that the franchisee is not under the full control of the franchisor. Therefore, there is always chance to free-ride in the franchise chain.

Risk

In research on decision making related to optimal ownership, risk has been mentioned frequently. The principal-agent model assumes that the principal (here the franchisor) is risk neutral or at least less risk averse than the agent (here the franchisee). The traditional agency model suggests that if there is more risk, it increases the need for agent insurance and thus desirability of vertical integration through company owned outlet (Lafontaine and Slade, 1997). According to previous research related to risk dimension of franchising, the risk comes from two sides: market situation and franchise contract. The demand fluctuation or variability is most frequently mentioned as market risk. Anderson and Schmittlein (1984) used "percent forecast error of product line sales by territory" as a measure for risk factor. Martin (1988) used "coefficient of variation of detrended sectorial sales" and Norton (1988) used "demand variability from detrended percent variations" as measures for risk factor. John

and Weitz (1988) used the index capturing environmental uncertainty as risk factor. However, empirical findings are opposed to this prediction (increased risk leads to more franchising). Bhattacharyya and Lafontaine (1995) show the possibility that incentive schemes of franchise contract may lead to more output variability.

In addition to the risk generated by the market, there are other types of risk that characterize the relationship with the franchisor. The first one is the contract length or the percentage of discontinued outlets that are related to the franchise contract (the percentage of discontinued outlets could depend on the strictness of the contract termination clauses) (Brickley *et al.*, 1991). In Lafontaine's (1992) work on business format franchising firms from all sectors, the fraction of outlets discontinued in sector was considered as the "risk" variable and data on contract length was captured. The proportion of company owned outlets could influence the franchisee's perception of risk in two contradictory ways. The franchisee can be assured if there are more company owned outlets (the franchisor's sign of involvement in the business). On the other hand, he can be intimidated if he thinks it is too aggressive (risk of franchise withdrawal at the end of the contract). Moreover the level of global advertising has similar effects (Michael, 1999). If the level is too low, the franchisee could feel that he is bearing more risk on the business because of inadequate involvement of the franchisor. If the level is too high, the franchisee can try to free-ride by making reduced efforts at the local level.

Competition
The level of competition directly affects the behavior of the agent whatever the contract type is. Especially in franchise systems, the sales price is often pre-fixed (or strongly recommended) by the franchisor at the regional or national level (e.g. McDonald's main menu costs 32FF everywhere in France). With little room to change his sales level by adopting different prices, the franchisee tends to increase his sales through greater service efforts in his business. The level of competition, therefore, plays a key role in choosing the optimum service level of the franchisee's efforts. On the other hand, the franchisor may or may not encourage the franchisee to increase the level of service efforts, which would make the business environment more competitive.

First of all, the level of external competition can directly affect sales by influencing the sensitivity of customers' buying attitude ("$1/b$" in the proposed model). The more there are competitors in the similar business who are offering substitutable products or services near to a franchised outlet, the higher the quality of services is required to get his customers to return. In addition to the external competition, the intensity of the internal competition among outlets of the same brand can explain why the franchisee tends to free-ride. In previous research, the internal competition level is often interpreted as the difficulty of monitoring. It is measured as the distance from the nearest monitoring center

(Brickley and Dark, 1987) or the density of outlets in a given territory (Lafontaine, 1999). In addition to the above two types of competition, one of very frequently referred variables – the percent of repeat customers – could be considered as a surrogate variable of competition. We can divide franchise business into two types: repeating business like automotive services, pet stores, business services, etc. and non-repeating business such as hotels, motels, fast foods, chain restaurant, etc. Brickley and Dark (1987) showed the significant difference of the percent of franchised units between two groups. It can be interpreted that if more customers come regularly to an outlet, less is the risk of free-riding of the franchisee. Thus the difference of percent of repeat customers among franchised outlets can play a role to explain the difference of incentives to increase service efforts by the franchisee (more repeating customers leads to more efforts to keep the quality of services).

Human capital
Previous research on franchise chains has mostly been based on the agency theory that analyzes from the point of view of the relationship between the principal and the agent. This approach focuses fundamentally on the analysis of the agent behavior in terms of the contract form incorporating the agent's under-motivation problem. It considers the franchisor-franchisee relation (high-powered contract) to be the same as that of the employer-employee (low-powered contract) and seeks the best way to motivate the agent to offer the optimum level of effort which can maximize the principal's profit or utility (Eisenhardt, 1989; Holstrom and Milgrom, 1994). The classical model of this approach often gives a static analysis assuming that the management efficiency of the agent is fixed.

Linking the management efficiency issue with free-riding incentives in franchise chain, this paper proposes a model of how cost structure of one outlet influences its quality of services. As its service operation becomes less cost effective (thus needing more costs to produce the same quality of services), the outlet's quality of services deteriorates to be locally optimal. The outlet owner, therefore, is more tempted to decrease its quality of services compared to the standard required by the franchisor.

After confirming the link of the management efficiency to free-ride incentive, one question remains: which factor determines the management efficiency of the outlet's service operation? Research evidence suggests that human capital dimension would be a critical dimension. As a franchisee accumulates more human capital (also referred to as "management know-how"), he can organize his service operation more efficiently (Hart, 1995). Consequently he can deliver better quality of services with the same cost than other franchisees possessing lower human capital. For the same reason, a franchisee with high cumulated human capital will need less cost to deliver a given level of the quality of services (for example, the standard level proposed by the franchisor) than

others. He will face lower incentives to decrease his quality level of services than others because his opportunity advantage of decreasing it should be smaller than that of others. Measuring the level of human capital is a tricky issue. The behavioral model of sales force orientation (using performance and learning) provided by Sujan *et al.* (1994) is a good example of this approach.

Interactions on the quality of services

The focus of this research is on the interactions between agents, rather than the relationship between principal and agent. The questions addressed in this paper are: why free-riding phenomenon (offering a lower quality of services than the standard required by the franchisor) in a franchise chain exists and how it can be influenced by different variables. It also focuses on different types of interaction process in which one agent adjusts his quality of services as the other reacts to it. The interaction arises when the quality of services of one agent influences the demand of the other one, called spill-over effect, similar to the effect of externality. The process of interaction in terms of the quality of services depends mainly on the type of spill-over (negative or positive, and additive or multiplicative), and the spill-over intensity.

Interaction between two outlets without competition
There exist cases of two outlets in the chain, where the quality of service of one outlet influences the demand of the other without competition between them. The idea is that improved services at a given outlet enhance the overall reputation of the chain, thus leading to larger demand for others in the chain. We assume a totally segmented market where a consumer can be informed about the quality of services in different location, but he can go only to the outlet of his location.

Interaction between outlets with competition
More generally, a customer has an access to more than two outlets of the same chain, which means that there exists competition among outlets of a chain. These outlets may or may not compete only on the quality of services. In some cases, outlets of a chain can be vertically differentiated on the quality of services with different range of prices to each outlet. But most of outlets in the franchise compete with each other with same price or a range of prices.

The model
Methodology
This research attempted to develop an analytical model of service quality interaction in franchise chains. With results based on chosen models, comparative static analysis was applied to explain free-riding incentives depending on specific variables. To make this more comprehensive, simulation of the reaction process was carried out by using the results of the static analysis.

The model

The model proposed here assumes that the sales amount (q) is a dependent function of price (p) and the quality of services offered by the franchisee (e_i) and the other franchised outlet (e_j). The potential willingness to pay is interpreted as a constant (a) and the demand fluctuation as a white noise with zero average (u_i). For the cost side, it is assumed that the total cost depends on the level of the quality of services and the amount of production. To raise a unit of the quality of services, it will cost the agent in quadratic form (increasing marginal cost) and he may keep the same unit cost for an additional increase of products.

The inverse demand function is:

$$\bar{p}_i = a_i + e_i + e_j - bq_i,$$

where:

e_i = the quality of services provided by outlet i;.

a = potential willingness to pay;.

$1/b$ = consumer's sensitivity to the quality of services change (as we consider the price is fixed);.

p = price (pre-fixed or ranged by the franchisor);.

q = demand; and.

c = unit price of production.

Demand is not only influenced by price, but also by quality of services:

$$TC(e_i, q_i) = e_i^2 + cq_i.$$

$TC(e_i, q_i)$ is the cost function of outlet i providing the quality of services level e_i, which is specified to be quadratic and c is unit cost of production of demand q_i.

This model represents the case of two isolated outlets where there is only the additive cross impact of the quality of services between two agents, not direct competition on same group of customer. This model is refined further to include the cost efficiency of the quality of services related to human capital dimension and the variation of sales related to risk dimension:

$$\bar{p}_i = a_i + e_i + e_j - bq_i + u_i, \tag{1}$$

$$TC(e_i, q_i) = \omega e_i^2 + cq_i, \tag{2}$$

where:

u = sales fluctuation with zero average; and.

ω = coefficient of cost for the quality of services.

Static analysis
In static analysis, we first deal with the simplest model, which illustrates the interaction of the quality of services in the separated two-outlet model with additive spill-over effect. The comparison of the optimal service quality between the models with and without spill-over effect, is also discussed. After having calculated the optimal quality of services, we carry out static comparative analyses using variables such as risk, competition, human capital, and the intensity of spill-over. To illustrate different types of the interaction process, we apply simulation techniques. Simulating the interaction process justifies the importance of the static analysis, because, in fact, this model assumes that agents decide simultaneously on the quality of services. Like Cournot-model decision making, there is no physical interaction on the quality of services between two agents. But, each chooses its own quality level with the consideration of the interaction with the other. This simulation result, therefore, shows the interaction process that happens not in the field but in the agent's mind.

The optimal quality of services
We assume that there are two agents having same demand and cost functions, and they react to each other on the quality of services. We consider the case that these two agents make decision on the level of the quality of services (e), which maximizes their profit.

First we consider the optimal quality of services in the model without spill-over on services between two agents. Two agents face same type of demand and have same cost structure as follows:

$$\bar{p}_i = a_i + e_i - bq_i,$$

$$TC(e_i + q_i) = e_i^2 + cq_i.$$

By satisfying the first and second order conditions, the optimal quality of services is:

$$e_i^* = \frac{(a - c)}{(4b - 1)}. \tag{3}$$

We now compare it to that of the model with additive spill-over (see Appendix 1), where the demand and the cost are:

$$\bar{p}_i = a_i + e_i + \delta e_j - bq_i,$$

$$TC(e_i, q_i) = e_i^2 + cq_i.$$

We obtain the equilibrium of:

$$e_i^* = \frac{(a - c)}{(4b - 1 - \delta)}. \tag{4}$$

The equilibrium of the model with multiplicative spill-over (see Appendix 2) is:

$$e_i^* = \frac{(a - c)(1 + \delta e_j)}{4b - (1 + \delta e_j)^2}. \tag{5}$$

The only difference between equilibrium equation (3) on the one hand and equations (4) and (5) on the other hand is the presence of δ, the intensity of spill-over. It means that as the spill-over exists, two agents start to react on each other's quality of services and they increase the quality as the positive spill-over effect becomes significant. The equilibrium with spill-over gets close to that without spill-over, as the spill-over effect approaches to zero.

Comparative statics
Based on equations (1) and (2), we now introduce more coefficients in order to analyze impacts of variables such as risk, competition, and human capital on service quality. Thus, we obtain the equilibrium of the quality of services as follows:

$$e_i^* = \frac{(a - c + u_i)}{(4b\omega - 1 - \delta)}, \tag{6}$$

where:
- risk is expressed in terms of $\text{Var}(u)$;
- competition is expressed in terms of $(1/b)$;
- human capital is expressed in terms of $(1/\omega)$; and
- intensity of spill-over is expressed in terms of δ.

Table III explains the relation of each variable to the optimal quality of services offered by the agent, as derived from the formulation in equation (6).

Variable	Impact on the optimal quality
Risk ($\text{Var}(u)$)	Positive or negative
Competition ($1/b$)	Positive
Human capital ($1/\omega$)	Positive
Intensity of spill-over (δ)	Positive

Table III.
Impact of variables on service quality

Simulation of equilibrium obtained from static analysis

The interaction between two agents with different spill-over intensity (based on the model with additive spill-over effect) is illustrated through simulation with hypothetical data in Table IV. The simulation was carried out using standard SAS simulation package. It helps us to understand what happens in each agent's mind. At line 1, two agents make their first decision, which is the same as the optimal quality level (0.33) without spill-over. They then start to react to each other. In case of small δ (where δ is 0.1), the equilibrium is obtained with small number of iteration and the optimal service quality level (0.345) is lower than the level (0.4) obtained with large δ (where δ is 0.5).

Thus, with simulation, we can visualize the virtual interaction process in case of simultaneous decision making on the quality of service and verify the signs of comparative static analysis.

Inferences and implications

This paper proposes a theoretical model of the "free-riding phenomenon" related to the quality of services in the franchise chain, and interactions on the quality of services between the independent outlets in different environments. As spill-over exists, two agents start to react to each other's quality of services and they increase the quality as the positive spill-over effect becomes significant. The equilibrium with spill-over gets close to that without spill-over, as the spill-over effect approaches to zero.

The formulations and results suggest tentative implications for theory, for marketing strategy, and for practitioners. A clear implication in the context of free-riding in franchise chains is the issue of monitoring by the franchisor. Monitoring could typically include site visits by franchisor's field representatives and customer satisfaction surveys to ensure adherence to well-defined service policies and mutually agreed termination clauses. McDonald's, as a franchisor, enforces the service operating standards

a	c	δ	b	e_i	e_j	a	c	δ	b	e_i	e_j	Line
2	1	*0.1*	1	0	0	2	1	*0.5*	1	0	0	0
				0.33333333	*0.33333333*					*0.33333333*	*0.33333333*	1
				0.34444444	0.34444444					0.38888889	0.38888889	2
				0.34481481	0.34481481					0.39814815	0.39814815	3
				0.34482716	0.34482716					0.39969136	0.39969136	4
				0.34482757	0.34482757					0.39994856	0.39994856	5
				0.34482759	0.34482759					0.39999143	0.39999143	6
				0.34482759	0.34482759					0.39999857	0.39999857	7
				0.34482759	*0.34482759*					0.39999976	0.39999976	8
										0.39999996	0.39999996	9
										0.39999999	0.39999999	10
										0.4	0.4	11
										0.4	*0.4*	12

Table IV.
Simulation results

through aggressive training and regular inspections, and the penalties for repeated offenses are severe (Lentz and Setrakian, 1997). This has led to a marked consistency in restaurant appearance, service and standards in all outlets. Close monitoring could potentially offset free-riding opportunities.

Optimal service quality depends on competition. Competition may be moderated by market segmentation, strategic grouping and geographical dispersion. Risk is a double-edged sword in influencing optimal service quality. If risk is too low or too high, service quality is low, while moderate risk is conducive to high optimal service quality. Human capital is shown to be a critical determinant of optimal quality of services. Any franchise organization needs to incentivize its employees to take a keen interest and make the personal investment and commitment needed to understand changing customer needs (Gerstenhaber, 2000). Lewis and Entwistle (1990) focus on the importance of personnel issues like teamwork, employee-job fit and training to offer high quality of service.

Do franchised chains offer adequate level of quality of service? The answer is both "yes" and "no". It is "yes" at the level of the individual franchisee and "no" for the overall franchise chain. Theoretical evidence suggests under-investment in a shared asset like service quality at a global level (for the franchise chain as a whole), because of opportunism and free-riding within franchisees. However, at the local level, as an individual franchisee starts to interact with another in the same franchise chain, each reacts to the other's quality of services, as spill-over exists. The local quality increases as positive spill-over effect becomes significant. This also provides an incentive to invest less in quality to maintain the desired level. Ramada Franchise System recently decided to discontinue 42 chain hotels under its franchise, because of lack of adequate service quality and consistency (Nozar, 2001). There was clear evidence of free-riding attempts.

Contribution, conclusions and future research

The contribution of this paper is in proposing a theoretical model of service quality interaction in franchised chains. Almost all studies on franchise chains adopting the agency theory perspective have focused on the principal-agent interactions. The main contribution of this study is in analyzing the issue of service quality in agent-to-agent interactions. The theoretical model proposed in this paper is limited in its application due to its assumptions, but nonetheless provides a first step in developing models to think about the issues raised.

Future research can empirically test the theorized model on real-life data. The model proposed in this study can be extended in future research to incorporate effects of geographic location, size, resources, market structure and age of the franchise outlets. For example, the lifecycle model of franchising (Michael, 1999) suggests that young franchisees face financial and resource constraints that may affect their ability to offer high service quality. This can

be incorporated into the model in future research. The difficulties in measuring, collecting, reporting and using quality-related cost information (ω, the coefficient of cost for the quality of services), as highlighted by Dale and Plunkett (1991), also need to be addressed to make empirical verification of the proposed model meaningful.

Behara and Gundersen (2001) observed that there is a need for service industry specific quality research and to address issues related to the appropriateness and adaptability of quality practices for services. This paper is a concrete step in that direction.

Notes

1. Resale price maintenance – the practice adopted by manufacturers to contractually limit the rights of distributors and retailers to set prices (Milgrom and Roberts, 1992, p. 39).
2. The service quality is a function of customer's expectation and the perceived performance (Zeithaml *et al.*, 1990).
3. Monitoring is more effective in case of smaller outlet, greater demand volatility, and less competition.

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Appendix 1. Solution of the model with additive spill-over

The profit function of the agent i is:

$$\Pi_i = p_i q_i - c_i(e_i, q_i) = (a + e_i + \delta e_j - bq_i) - (e_i^2 - cq_i).$$

First order conditions are:

$$\frac{\partial \Pi_i}{\partial q_i} = a + e_i + \delta e_j - 2bq_i - c = 0, \qquad (A1)$$

$$\frac{\partial \Pi_i}{\partial e_i} = q_i - 2e_i = 0. \qquad (A2)$$

Second order condition requires that b should be positive.

Combining equations (A1) and (A2), we get an equation showing the interaction of service quality between agent i and j (see Figure A1). If b is less than one-quarter, the equilibrium will be lower than the optimum without spill-over. For a moment, we consider the case where b is greater than one-quarter.

$$e_i^* = \frac{\delta}{4b-1}e_j + \frac{a-c}{4b-1}$$

Figure A1.
Equation showing the interaction of service quality between agent i and j
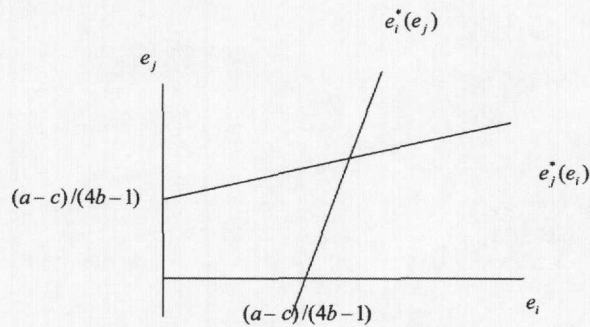
The optimal level of the quality of services is:

$$e_i^* = e_j^* = \frac{(a-c)}{(4b-1-\delta)}.$$

Appendix 2. Solution of the model with multiplicative spill-over
The profit function of the agent i is:

$$\Pi_i = p_i q_i - c_i(e_i, q_i) = (a + e_i + \delta e_i e_j - bq_i) - (e_i^2 - cq_i).$$

First order conditions are:

$$\frac{\partial \Pi_i}{\partial q_i} = a + e_i + \delta e_i e_j - 2bq_i - c = 0, \tag{A3}$$

$$\frac{\partial \Pi_i}{\partial e_i} = q_i + \delta e_j q_i - 2e_i = 0. \tag{A4}$$

Combining equations (A3) and (A4), we get an equation showing the interaction of the quality of services between agent i and j:

$$e_i^* = \frac{(a-c)(1+\delta e_j)}{4b - (1+\delta e_j)^2}.$$