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Strategic collaboration management between Indian oil marketing and auto-service companies

An empirical study

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Abstract

Purpose – The downstream oil marketing companies (OMCs) have an opportunity to compensate their huge under-recovery by increasing non-fuel revenues through strategic planning for collaboration with organized companies (OCs) of auto-servicing sector, who are experiencing a surge in the demand for auto-servicing. The purpose of this paper is to explore the business need for strategic collaboration and empirically validate the building mechanism for collaborative capacities between the two sectors (OMCs and OCs).

Design/methodology/approach – The paper is designed to explore the implementation of collaboration using needs analysis, exploratory factor analysis and structural equation modelling process for building collaborative capacities between the two sectors.

Findings – Although alignment is a necessary condition before allowing for a valid collaboration between the two sectors, the external alignment process is highly significant for implementing collaboration unlike the internal alignment process.

Research limitations/implications – Methodological limitations include the use of convenience sampling and anonymous survey-based research.

Practical implications – Selecting the "right" identified factors for collaboration is unquestionably one of the most important topics in the collaboration literature, which holds vast practical implications.

Originality/value – This study provides practical and theoretical insights for implementing collaboration based on empirical results.

Keywords Structural equation modelling, Collaboration, Supply chain management, Strategic management, Auto-service companies, Oil marketing

Paper type Research paper

1. Introduction

The oil and gas sector consists of three segments – upstream, midstream and downstream. The upstream segment is primarily comprised of companies that are engaged in exploration and production activities, while the midstream segment

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comprises companies in storage and transportation, and the downstream segment comprises companies that are engaged in refining, processing and marketing of petroleum products (IBEF, 2013). Public sector oil marketing companies (OMCs) in the downstream sector in India have experienced a very challenging phase due to policies of the Government of India (GOI). There is severe under-recovery in regulated and subsidized prices of diesel, kerosene sold through public distribution system (PDS) and domestic liquid petroleum gas (LPG) sold by OMCs (Bhattacharjee *et al.*, 2013). Under the financial burden sharing mechanism, the under-recovery incurred by the OMCs is partially compensated by the GOI and by the upstream oil companies. Though the price of diesel is being decontrolled since January 2013 in a phased manner, the prices of kerosene and LPG continue to be subsidized (Bhat, 2014).

This situation led the OMCs to think more innovatively to generate additional revenue from non-conventional sources. In the retail arena, it is the business for non-fuel revenues (NFR) business that is gaining importance day by day. Each company is making efforts to add more services by leasing a part of their premises to companies that offer services such as fast food, supermarkets, banking, tyres, batteries and accessories, pharmacies and many such areas including automobile services. With the entry of private and multinational companies (MNCs), the OMCs have no other option but to compete with these companies by attracting more customers by providing facilities like automated fuel filling, petro card and other allied services (Kishore and Patel, 2012). With nearly 50,000 petrol pumps across the entire country, this provides a huge opportunity to generate NFR (Rai *et al.*, 2012).

The automobile sector in India is growing steadily. During the last decade the sector has grown at a compounded annual growth rate (CAGR) of nearly 10 per cent (Tiwari and Herstatt, 2014). According to Boston Consultancy Group (BCG, 2013), while the current economic conditions have challenged the short term growth scenario of the sector, the long term prospects are expected to remain robust owing to strong fundamental demand and supply factors. BCG (2013) report estimates that the Indian automobile industry size is at US$80 billion. Along with the mammoth increase in the number of vehicles, and the advancement of vehicle technology, the demand of professional services has increased many fold.

To cope up with the demand, the original equipment manufacturers (OEMs) are required to increase their service network. But due to very high real estate cost and high involvement of working capital in establishing service centres, the auto-OEMs are finding it difficult to expand at that desired rate. As a result, most of service business pertaining to maintenance and repairs is in the hands of unincorporated private enterprises owned by individuals or households engaged in the sale or production of goods and services operated on a proprietary or partnership basis and with less than ten total workers (Sengupta, 2007), we term these as "the unorganized". There is also a growing segment of organized service providers aggressively competing for business.

Though huge business potential and a growing demand in professional services in the auto-service sector exists, there is hardly any synergy found in India between the OMCs and organized companies (OCs) to set up service units at petrol pumps by which the OMCs can maximize the NFR and the OCs can increase the reach of their service network through strategic collaboration between them. Though different collaboration models and processes have been prescribed by many researchers, there is no empirical validation of any strategic collaboration model between the two sectors.

This study intends to establish the business need for strategic collaboration between OMCs of downstream oil sector and OCs of auto-servicing sector and provides

direction, purpose and rationale for validating the model of collaboration. To approach this objective, exploratory factor analysis (EFA) on environmental items in the marketplace responsible for collaboration is carried out in order to make constructive and valid suggestions on implementable market actions. The study has been limited to passenger vehicle segment only, as the service buying behaviour is different in different segments of vehicles and petrol pumps are preferred locations for auto care services for passenger vehicles all over the world.

2. Sector analysis

It may be worthwhile to explain the two sectors that may be useful for proper understanding of the problems and the need for strategic collaboration.

2.1 Oil sector

Indian downstream oil sector is predominantly dominated by three Public Sector Undertaking (PSU) companies namely Indian Oil Corporation Ltd, Hindustan Petroleum Corporation Ltd and Bharat Petroleum Corporation Ltd. Besides them, Oil and Natural Gas Corporation Ltd, the largest company in upstream sector, is also present in the downstream segment. There are also a few joint venture companies of PSUs like Mangalore Refinery and Petrochemicals Ltd and Numaligarh Refinery Ltd who are also present in this segment of oil sector. Among the private players, Reliance Industries Ltd with their group company Reliance Petroleum Ltd and Essar Oil Ltd are the major players. All these companies are present in refining and marketing of petroleum products in the country. Shell is another private MNC who is present only in retailing of fuels and lubricants. The number of retail outlets, commonly known as petrol pumps, is one of the yardsticks for showing the presence of these companies in the country. As these are the primary touch points for the automobiles, this study is focused only in this area to assess their linkage with OCs of auto-service sector.

To protect the consumer from the impact of a rise in oil prices in the international market and in view of the domestic inflationary conditions, the GOI continues to modulate the retail selling prices of diesel, domestic LPG and PDS kerosene at administered price and the prices of such products are not revised in line with the prices in the international market, resulting in incurrence of under-recovery to the OMCs on sale of these products (Singh, 2013). The under-recovery figures on sensitive petroleum products set to come down by 20 per cent to Indian rupees(INR) 1,110 billion in 2014-15 from INR 1398.69 billion during 2013-2014 owing to the decline in subsidy on diesel and rupee appreciation (Indian Oil & Gas, 2014). This situation has prompted the OMCs to generate NFR from the petrol pumps. One of the potential areas for such NFR is auto care services. In most developed economies like the USA, France and rest of Europe; the contribution of NFR for the petroleum retailers are highly significant nearly 39, 25 and 15 per cent respectively (Kotwala, 2005). In UAE, the contribution of NFR averages 12~15 per cent for different players. In India, the contribution of NFR is less than 1 per cent (Kishore and Patel, 2012).

2.2 Auto-service sector

India is now the sixth largest passenger vehicle manufacturer in the world (BCG, 2013). On the global map, India has developed as the hub for small car development with potential as a supply hub for "sport utility vehicles". In addition to the strong domestic demand, the OEMs have also been positioning themselves as competitive small car makers, benefitting from India's technological capabilities in the manufacturing small cars, economies of scale and a well-established component supplier base (Ghosh *et al.*, 2011).

There were only four Indian companies in the passenger vehicles segment. After the success of Maruti Udyog Limited, a joint venture with Suzuki, Japan and liberalization of the economy in early 1990s, there has been regular entry of foreign OEMs. As the GOI is allowing 100 per cent foreign direct investment, the growth in investment by MNCs is substantial.

There is huge growth in all segments of the automobile industry. The CAGR during last 15 years in passenger vehicles segment is 8.9 per cent (Tiwari and Herstatt, 2014). Though there has been downward trend in the last couple of years, the current political and socio-economic condition indicates that the trend will be reversed. The major growth drivers for such exemplary performance in domestic sales of passenger vehicles are steady economic growth, favourable demographic profile, rising per capita gross domestic product, rising disposable income levels, relatively low-penetration levels, availability of finance at competitive rates and shift of demand scenario to smaller towns and rural areas (Ghosh *et al.*, 2011).

The services in passenger vehicle segment are categorized into four types – routine maintenance, minor repairs, major repairs and accident repairers. From the general market survey, it is revealed that the older vehicles mostly do not opt for authorized repairers and normally prefer to visit the unorganized sector. But due to advancement in technology, the demand of skilled services is increasing very rapidly. Hence it gives rise to the demand of professional auto-services and to a major opportunity for OCs. In addition, high real estate cost in major cities with high car density, has become the major obstacle to expanding the service network. The collaboration between OMC and OC can lead to a right synergy towards a win-win situation provided the right model of collaboration is adopted.

2.3 Trend of collaboration in automobile industry

The automobile industry is witnessing collaborative arrangements such as sharing engines/platforms and distribution and service network. Some of the active alliances in India include Fiat-TML "Tata Motors Limited" (manufacturing JV "joint venture" and distribution sharing arrangement); Renault-Nissan (proposed facility share); SAIC-GM (Indian operation under JV, to bring products from SAIC stable), VW-Suzuki (likely collaboration in small car), Renault-Bajaj (small car). The number and scope of such alliances are expected to increase going forward as OEMs aim to rationalize their investments and maximize reach through alliances spanning technology, manufacturing and distribution (KPMG, 2010). However, there is no established collaboration in auto-service space between the OCs.

3. Review of literature

Strategy needs to evolve, update and change in real time. Through the 1970s and 1980s, the dominant school of strategy was the environmental school, which sees companies as seeking to protect their competitive advantage through their control of the market for their products (Wernerfelt, 1984). Since the early 1990s, the resource-based view (RBV) of the strategy became highly influential. It emphasized the internal capabilities of the companies in formulating strategy to achieve and protect their sustainable competitive advantage in its markets and industries by building up dynamic resources which would be difficult to imitate (Berney, 1991; Chaharbaghi and Lynch, 1999). Although the classic RBV has an obvious appeal even after common criticism on how resources can develop and change over time, the contemporary research has surfaced

on resource-based advantage within a broader network context as the extended RBV, which assumes that strategic resources lying beyond the boundaries of the company can be used to generate "collaboration specific quasi-rents", emphasizing their reliance on inter-firm relationships.

Traditionally supply chain management (SCM) had been limited to leverage the supply chain to minimize the cost while assuring supply. However, since the start of the twenty-first century, collaboration in supply chains is a commonly examined topic in the SCM literature (Horvath, 2001; McLaren *et al.*, 2002; Holweg *et al.*, 2005; Ajmera and Cook, 2009; Bhattacharjee and Mohanty, 2012). By reviewing the literature on collaboration during 1988 to 2014 and a compilation made by Ahmad and Asadullah (2013), collaboration can be defined as a process of working together by two or more firms over a given economic space and time through co-operation, sharing human, financial and technical resources, maximizing resource effectiveness, exchanging common planning, management, execution and performance measurement information, aligning their supply chain to achieve their separate but complimentary goals and objectives, to maximize value to end customers and stakeholders and creating competitive advantage which cannot be achieved by acting alone. Accordingly, collaborative SCM is to be viewed as one SCM strategy that is likely to lead significant benefits, including customer service improvements, cost reduction, efficient use of resources and business process improvement (Udin *et al.*, 2006).

In the context of oil and gas sector, collaborative relationships had been exceptionally frequent and normal among companies in the upstream (exploration and production) (Green and Keogh, 2000). In order to capture new sources of revenue, the oil and gas sector needs to expand its focus downstream from operational excellence to customer allegiance, which has eventually received little attention in supply chain research (Bhattacharjee and Mohanty, 2012; Guan and Rehme, 2012; Bhattacharjee *et al.*, 2013). Such collaboration between strategic partners is becoming incredibly important in generating value with collaborating partners both tactically and strategically (Mohanty and Augustin, 2014). Particularly, key partner management underpins the core belief for implementing collaborative relationships strategically (Norris-Tirrell and Clay, 2010). According to Setnikar Cankar and Petkovšek (2013), collaboration between public and private sectors and between private service providers themselves creates better and more effective public or private services and products. In our research, the OMCs are from the public sector and the OCs are from the private sector and their collaboration could be a potentially strategic initiative.

In order to capture the elements of collaboration with an objective to develop a model, the studies made in this field since 2000 have been critically reviewed by presenting a comparative evaluation based on essential criteria relating to collaboration. These criteria have been identified after studying the literature on collaboration models prescribed by different authors during the period 2000-2014. Table I depicts a comparative evaluation in which the importance of each of the criterion has been established.

Some of the significant findings from the review of literature are as follow:

- Almost all the studies have attempted to define collaboration, and have viewed collaboration strategically, but empirical analysis has been rarely carried out.
- Only few studies have reported EFA of environmental scanning items responsible for collaboration. Still fewer studies have reported for confirmatory factor analysis of environmental scanning items responsible for collaboration.

Table I.
Evaluation of studies on collaboration in supply chain

Evaluation criteria	Anthony (2000)	Horvath (2001)	McLaren *et al.* (2002)	Wisner (2003)	Barratt (2004)	Holweg *et al.* (2005)	Cassivi (2006)	Ha (2007)	Soosay *et al.* (2008)	Barro (2009)	Ramesh *et al.* (2010)	Cao *et al.* (2010)	Fawcett *et al.* (2011)	Bhattacharjee and Mohanty (2012)	Cai *et al.* (2013)	Ramanathan and Gunasekaran (2014)
Definition and meaning of collaboration	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Need analysis for collaboration								✓			✓	✓		✓	✓	✓
Definition and meaning of strategic collaboration					✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Need analysis for strategic collaboration					✓			✓								
Exploratory factor analysis of environmental scanning items responsible for collaboration										✓		✓	✓			✓
Confirmatory factor analysis of environmental scanning items responsible for collaboration												✓	✓			✓
Internal alignment process						✓	✓	✓				✓	✓	✓	✓	✓
External alignment process				✓		✓	✓	✓				✓	✓	✓	✓	✓
Strategic outcome				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓
Barriers to collaboration	✓	✓							✓	✓	✓			✓	✓	✓
Benefits of collaboration	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓		✓	✓
Skills for collaboration					✓	✓	✓		✓	✓	✓		✓			
Guidelines for collaboration practice														✓		✓
Study involving downstream oil and gas industry														✓		

Note: The markings "✓" denote that the criteria (in rows) are present in particular study on (strategic) collaboration in supply chain (in columns)

- Only a few studies have reported internal alignment process for collaboration, while relatively a little more number of studies has reported external alignment process for collaboration.
- Many studies have linked collaboration with strategic outcomes.
- Although most studies dealing with collaboration do highlight barriers, benefits and skills required, but only a few studies have provided guidelines for collaboration practice.
- There is only one conceptual paper which deals with collaboration between downstream oil sector and auto-service sector (Bhattacharjee and Mohanty, 2012).

Importantly, out of the reviewed articles on collaboration, we find little research covering all the criteria for collaboration in the supply chain literature (see Table I). This suggests a dearth of empirical research relating to collaboration in supply chain.

4. Research design process

The research design is the blueprint for fulfilling objectives and answering questions. This section describes procedural design of the research and its choice among competing designs to yield results that are as objective as possible.

4.1 Research design: type and purpose

4.1.1 Type. This study has been carried out in two stages. The first stage involves need analysis and exploratory research leading to problem identification through survey of literature for determining environmental items of the marketplace for collaboration between OMCs and OCs to make suggestions on applicable market actions in particular with respect to repair and maintenance of passenger vehicles. The second stage involves causal research for empirical validation to select the best strategies for collaborative business between OMCs and OCs using SEM process through an independent sample. In order to empirically validate the conceptual model, exploratory factors are first needed, which go through confirmation only with an independent sample for application of SEM process (Prakash *et al.*, 2011b; Mohanty and Prakash, 2014).

4.1.2 Purpose. In order to define the validated factors for collaboration between OMCs of downstream oil sector and OCs of auto-servicing sector, following objectives are drawn up:

- to assess the need for collaboration between OMCs and OCs;
- to understand the need for collaboration between OMCs and OCs;
- to explore and define the factors of environment responsible for collaboration between OMCs and OCs; and
- to determine the nature of relationships among variables of collaboration between OMCs and OCs for appropriate alignment towards desired strategic outcome and empirical validation using structural equation modelling (SEM).

4.2 Selection of questionnaire: theme, issues and pre-testing

4.2.1 Theme. There exists a viable business prospect for collaboration between OMCs and OCs.

4.2.2 Issues. Collaboration between OMCs and OCs when conceptualized strategically can help OCs to leverage the large network of petrol pumps of the OMCs to expand its service network and the same will also help the OMCs to boost NFR.

4.2.3 Pre-testing. Pre-testing was carried out using responses of five managers each of OMCs, OCs, petrol pump dealers and passenger vehicle dealers in Greater Mumbai region.

4.3 Sampling design: sampling frame, sampling method and sample size

4.3.1 Sampling frame. Our sampling frame was the list of known contacts with working telephone numbers and e-mails for both stages of the study.

4.3.2 Sampling method. We have used non-probability convenience sampling for both stages of the survey considered in this study using questionnaire posted through Google Drive to known contacts only.

4.3.3 Sample size. The first stage of survey involved 202 respondents for which the χ^2 statistic was 18.7686 with p-value as 0.094268 signifying insignificance at $p < 0.05$ for which two attributes, namely, respondent category and experience, are independent to be adequate for applying independence methods of multivariate analysis techniques like EFA. The second stage of independent survey involved 264 respondents for which the χ^2 statistic was 10.2189 with p-value as 0.596763 signifying insignificance at $p < 0.05$ for which two attributes, namely, respondent category and experience, are independent again as to be adequate for applying independence methods of multivariate analysis techniques like confirmatory factor analysis using SEM. The independent survey in the second stage was required as the first stage responses have established the factors on which also opinion were to be gathered for confirmatory factor analysis.

4.4 Collection of data: administration of questionnaire and interview

4.4.1 Administration of questionnaire. The target respondents chosen were among the managers of OMCs and OCs, petrol pump dealers and passenger vehicle dealers from different experience categories. Respondents were asked to participate in the survey voluntarily. The questions were in five-point Likert scale. The first stage of the survey questionnaires was administered during May 2012 and December 2012, while the second stage of the survey questionnaires was administered from April 2013 to January 2014.

4.4.2 Interview. Some focus group interviews were conducted with senior managers and their team members from both the sectors and specific comments made were noted.

4.5 Assessment of factors for collaboration: need analysis, EFA

This section is an outcome of the first stage of the study, which is explained in Section 5.

Needs analysis for collaboration between OMCs and OCs was carried out for identifying feasibility of a range of options of professional services, namely, routine maintenance, minor repair, major repair and accidental repair for multi-brand car service outlet if managed by professional groups at petrol pumps.

Thereafter, EFA was carried out to ensure that factors of environment responsible for collaboration between OMCs and OCs must behave statistically as expected or they need to be refined or deleted based on responses of administered questionnaire.

4.6 SEM process: examining and selecting the best strategy

This section is an outcome of the second stage of the study. An inventory of likely strategies for model of collaboration between the two sectors has been proposed for examination. Using SEM process, a best-fit model has been established from an independent sample, which validates the multiple-item scale of collaborative factors. It produced the valid goals within the constraints of their resources consistently to facilitate making proper alignment externally and internally. The SEM process applicable to this study has been explained in Section 6.

5. Assessment of factors for collaboration

This section intends to discuss a call for action or need that ignites people to act for collaboration (see Section 5.1). This identified need when understood and refined should portray a clear picture of what is hoped to be created, which is similar to shared vision in the context of strategic planning, which can be a carefully crafted statement capturing the motivation for the collaboration. Further, EFA on environmental items helps to find out marketing forces applicable to the collaboration process (see Section 5.2).

5.1 Needs analysis

Respondents prefer visiting multi-brand car service outlets for availing services of the nature of minor repair and/or routine maintenance with relatively more frequency for minor repair. However, if such multi-brand car service outlet is at petrol pump, respondents would prefer visiting for minor repair and/or routine maintenance with relatively more frequency for routine maintenance, which emphatically substantiates the need for having routine maintenance facility at the petrol pump. This is an important result, which eventually prompts for the prospective collaboration between OMCs and OCs.

5.2 Understanding outcome of needs analysis

In order to understand the need for collaboration between OMCs and OCs, the development of mission statements is important to capture the shared vision (the direction), unique purpose (what is to be achieved) and the values and beliefs (the motivation) of the collaboration. Accordingly, the direction has to guide an action plan for implementation of collaboration between OMCs and OCs strategically in systematic manner to sharing ideas to grow together on being connected with others for getting rewarded both financially and non-financially, improving customer satisfaction, imbibing trust, and utilizing physical assets and knowledge through skills development. Moreover, given the complex community expectations favoring under-recovery of OMCs, and increasing demands of auto-services of OCs constrained by current economic climate of limited resources, it is important that both OMCs and OCs look at collaboration as ways to respond to understandable challenges strategically. This can result in a feasible possibility only if both OMCs and OCs make proper alignment externally and internally to realize purposeful strategic outcomes from collaboration, which has to be mutually beneficial.

5.3 EFA

EFA was used to explore workable data of 202 respondents. This was subjected to principal axis factoring with rotation method as varimax with Kaiser normalization. EFA on 11 items of environment for collaboration between OMCs and OCs revealed a

three-factor structure that explained 60.604 per cent of total variance. The criteria for retaining the three-factors were Eigen values greater than one and the ability to describe and label each factor. There is the obligatory requirement of 0.60 or above for Cronbach's α coefficient to demonstrate internal consistency of the established scales (Nunnally, 1978). Likewise, the minimum acceptable value of KMO is 0.5 (Prakash *et al.*, 2011a). These statistical tests on results of EFA showed the proposed items and dimensions of the instrument were sound enough to measure the environmental aspects of collaboration between OMCs and OCs. The first factor is labelled as market competition grouping items, namely, competitor strength, competitor weakness, competitor strategy and market threat. The second factor is labelled as market influence grouping items, namely, consumer influence, government influence and social influence. The third factor is labelled as market opportunity grouping items, namely, business potential, sharing of assets, sharing of knowledge and growth prospect.

6. SEM

This section intends to discuss validation-specific statements of what collaborative partners intend to do internally and externally for strategic outcome to establishing well-formed goals. Partners take an inventory of likely strategies and choose those that are most likely to produce the valid goals within the constraints of their resources consistently. This research section is inspired by the methodology for empirical validation using SEM process as detailed in Prakash *et al.* (2011b).

The SEM process was carried out in an independent sample, which was the second stage of the survey, for which the target population was managers of the downstream OMCs and OCs, petrol pump dealers and passenger vehicle dealers.

With a sample size of as small as 50, the valid results can be obtained. But to get stable maximum likelihood estimation, the recommended minimum sample size is 100-250. For larger sample sizes (>400), the process can be very sensitive and any variation can be detected. This can make the goodness-of-fit measure to be poor fit. According to Prakash *et al.* (2011b), a sample size should be 10-20 times of the number of indicators so that the models generated through SEM process are identified, but that may not be sufficient. In this research, with the sample size of 264, SEM models could be identified and hence, the sample is considered adequate.

6.1 Define the individual construct

The collaboration process has been conceptualized including in our data set, four constructs (environmental scanning, internal alignment, external alignment and strategic outcome) and 20 indicators (four items of environmental scanning, six items of internal alignment, five items of external alignment and five items of strategic outcome) (Bhattacharjee and Mohanty, 2012). To measure internal alignment, we have used five indicators, namely, empowered team (EM_TEAM), gap in business processes (GAP_BP), set milestone (SET_MILE), human resource development collaborative culture (HRD_COLL) and select partner (SEL_PARTNER). To measure external alignment, we have used four indicators, namely, set common goal (SET_GOAL), share resources (SH_RESOURCE), roles and responsibilities of partners (ROLE) and set processes (SET_PROCESS). Likewise, for measuring strategic outcome (OUTCOME), we have used four indicators, namely, rewards – both financial and non-financial (PROFIT), customer satisfaction (CSAT), trust in the relationship between the partners (TRUST) and utilization of physical assets and knowledge (UTILIZE).

6.1.1 Measurement and scaling. Each construct has multiple-indicator variables. Each indicator was measured using a five-point Likert scale where respondents have a "neutral" as middle point and where "1" means "very low" and "5" means "very high" for every statement (item) in respect of importance of the item for a successful collaboration between OMCs and OCs.

6.1.2 Test reliability for pretested dimensions. For the purpose of carrying out SEM, a reliability analysis with selected dimensions for each retained sub-scale items of collaboration process was conducted for 264 cases comprising of independent samples based on convenience sampling using SPSS. The internal consistency (Cronbach's α) was estimated for market competition as 0.792, market influence as 0.681, market opportunity as 0.664, internal alignment as 0.622, external alignment as 0.641 and strategic outcome as 0.675 ranging from 0.792 to 0.622. Hence, the sub-scale items demonstrate high internal consistency.

6.2 Specify the measurement model

The overall measurement model has been planned to be recursive. There are 44 variables and 90 parameters in the measurement model. In testing for the measurement model, we freely correlated the mentioned four constructs upon fixing the factor loading of each construct to a value of unity. All measured items are allowed to load on only one construct each, and the error terms are not allowed to correlate with each other. The measurement model is described in Figure 1.

6.3 Assess the measurement model

The validity of the measurement model depends on the goodness-of-fit results, evidence of adequacy of construct validity, especially convergent and discriminant validity (Hair *et al.*, 2006). We now examine the results of testing this measurement model against reality as represented by this sample with respect to overall model fit and the criteria for construct validity. Our measurement model ($n = 264$) yields the model fit results. The general rule of thumb suggests that at least one absolute fit index and one incremental fit index, in addition to the χ^2 result should be relied upon. These fit indices collectively indicate that overall fit of the measurement model is acceptable.

Note that Amos refers to factor loadings as regression weights and their significance provide a useful start in assessing the convergent validity of the measurement model (Prakash *et al.*, 2011b). Almost all loadings are highly significant as required for adequacy test of construct validity, which means that variables do correlate well with each other within their parent factor. This implies that the latent factor is well explained by its observed variables.

Further, for fully establishing the convergent validity for latent factors, we find composite reliability (CR) greater than 0.7. In addition, we find that the square root of average variance extracted (AVE) is greater than 0.5, which implies variables do not correlate highly with variables outside their parent factor than with the variables within their parent factor. That is, the latent factor is not better explained by some other variables than by its own observed variables, which establishes discriminant validity.

6.4 Specify the structural model

Based on theoretical considerations, we hypothesize environmental scanning as a higher order construct. Other constructs like internal alignment and external alignment will have linkages with environmental scanning besides linkages between them.

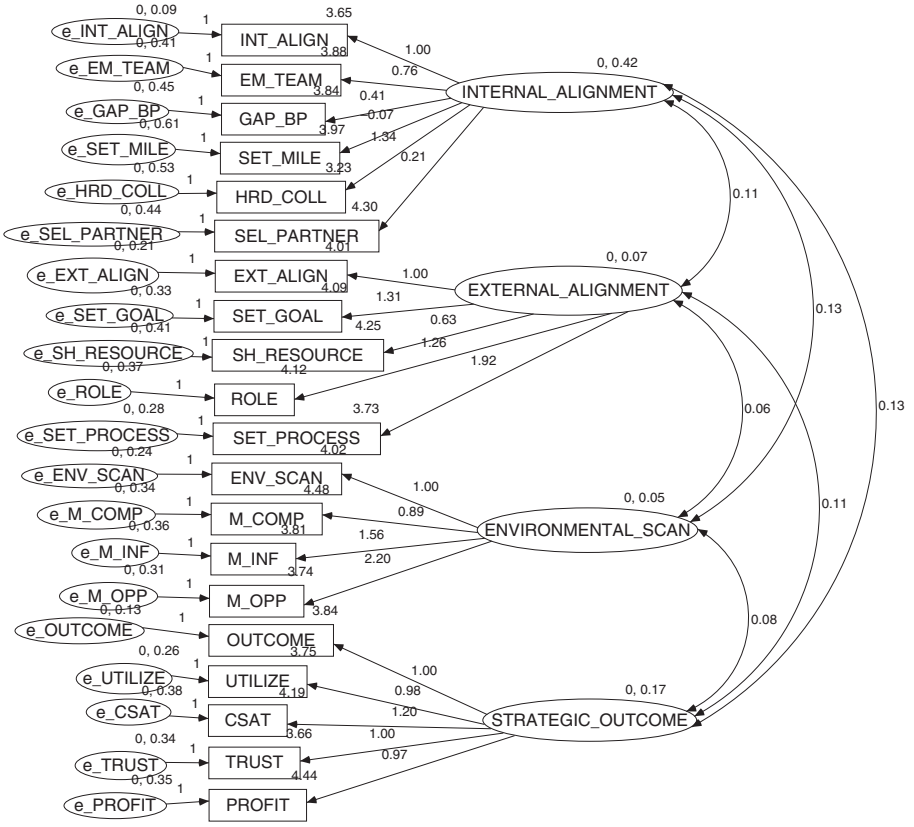

Figure 1.
Measurement model

The lowest order construct will be strategic outcome which will have linkages to internal alignment and external alignment. The entire structural model is tested simultaneously. There are 47 variables and 92 parameters in the structural model. In testing for the structural model, we free the structural linkages and fix the factor loading of each construct to a value of unity. While the measurement model tests for reliability and validity of the measures, the structural model tests for the structural relations in the model. The structural model is described in Figure 2.

6.5 Assess the structural model

The validity of the structural model depends on the goodness-of-fit results and nomological validity. We estimated the structural model with the same sample ($n = 264$) yielding the satisfactory model fit results. Collectively, these fit indices indicate that the structural model is acceptable. That is, the second-order model is robust and theoretically explains the constructs of satisfaction and patronage intention.

6.6 Make comparison of all possible alternative structural models

The last step in this analysis is to generate alternative models (see Figures 3-6) and compare it to the structural model. Hair *et al.* (2009) suggest that numerous alternative models may provide an equal or even better fit. Therefore, it is necessary to test

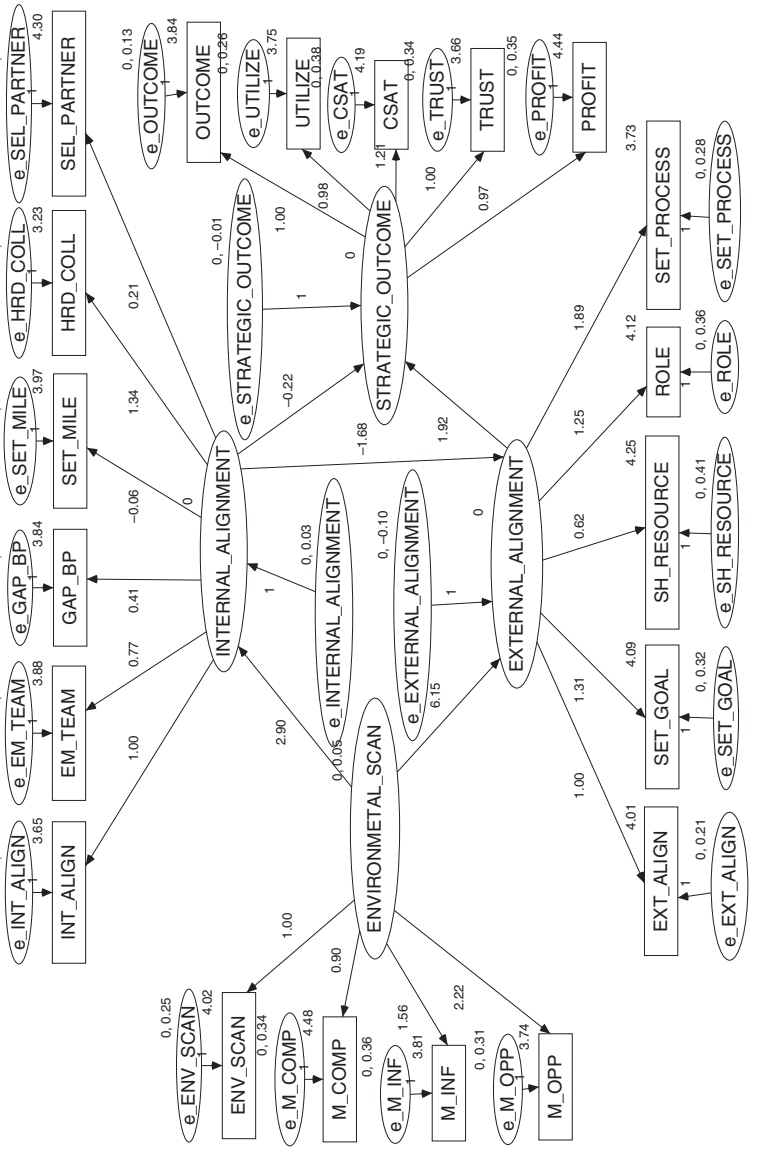

Figure 2.
Structural model

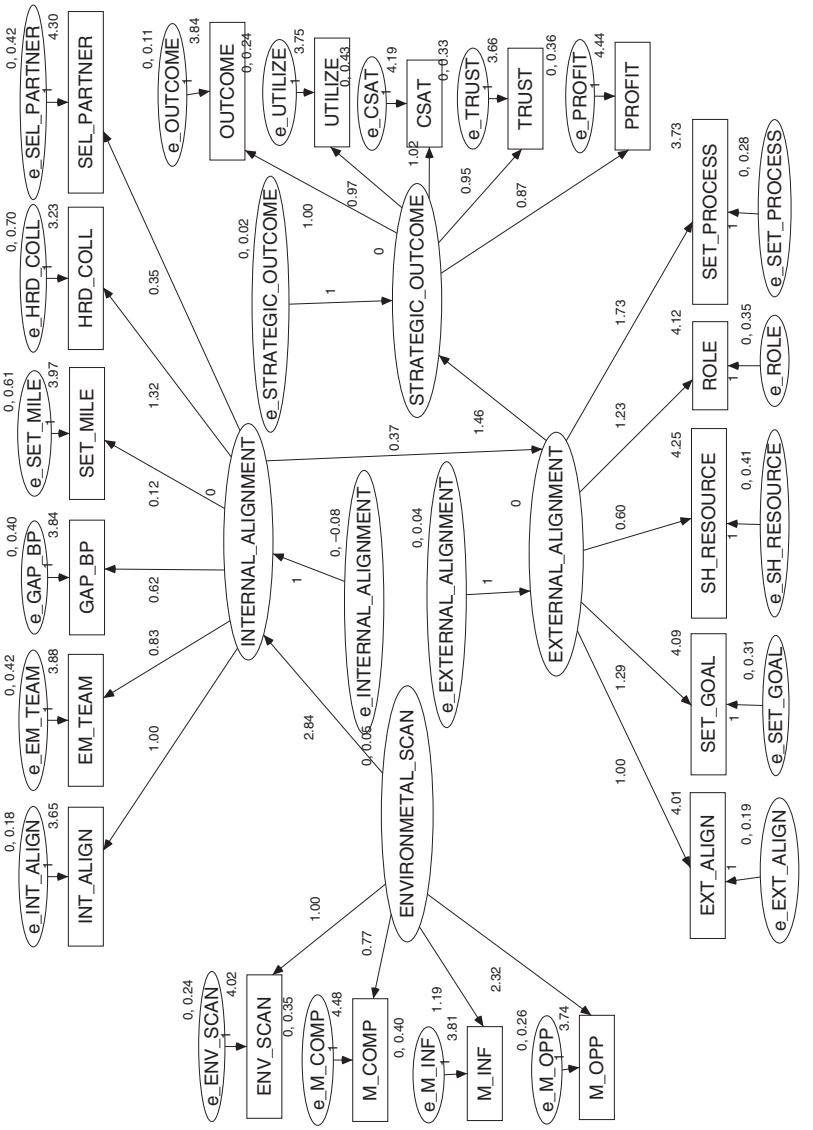

Figure 3.
Alternative Model No. 1 (AM 1)

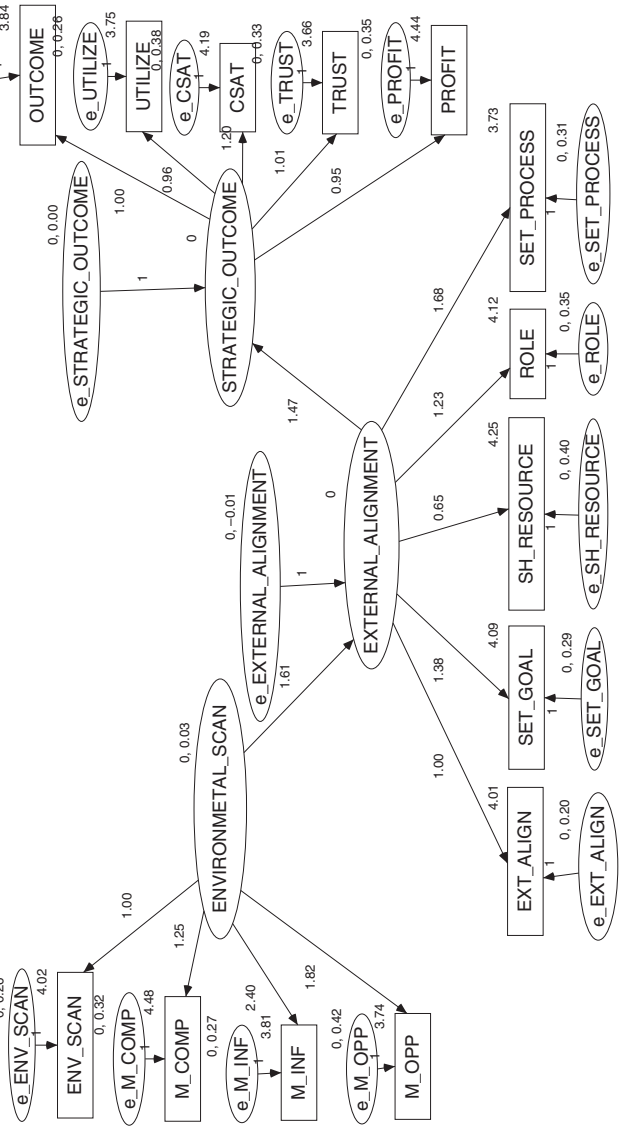

Figure 4.
Alternative Model No. 2 (AM 2)

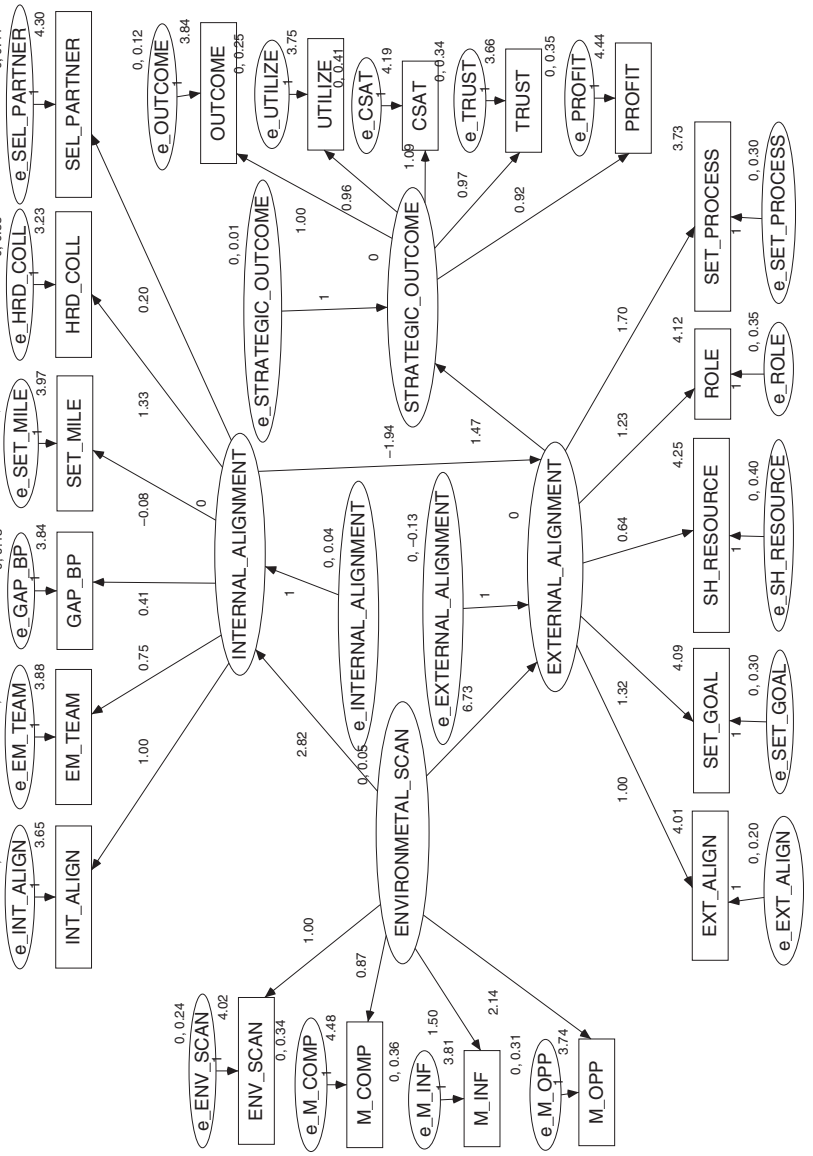

Figure 5.
Alternative Model No. 3 (AM 3)

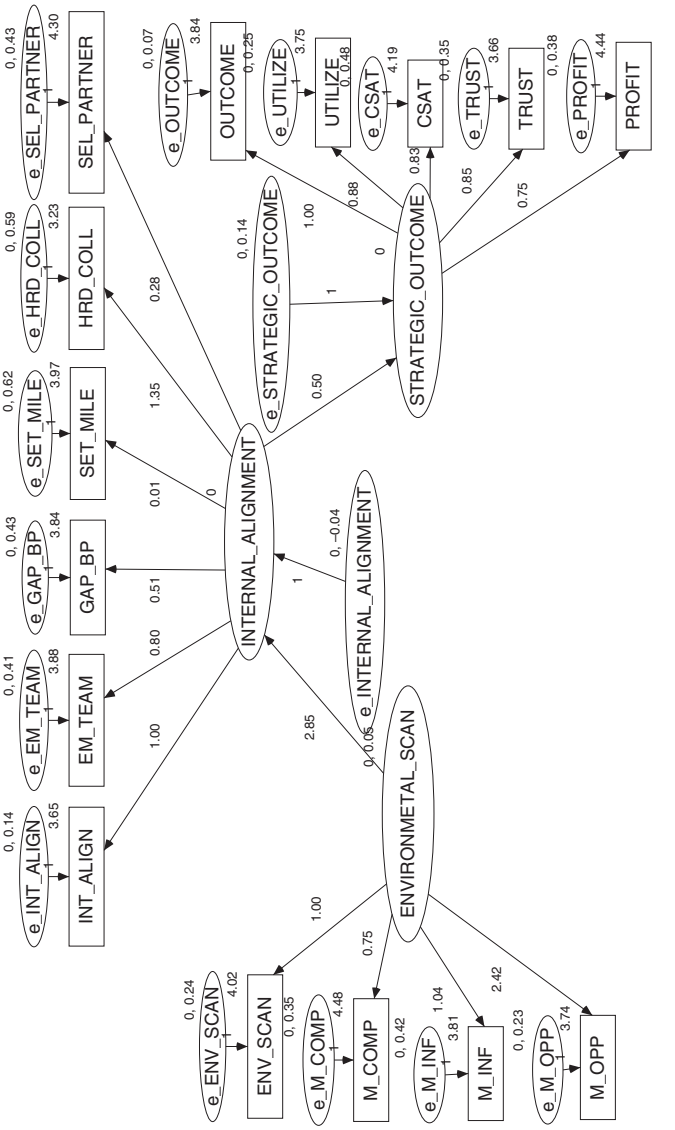

Figure 6.
Alternative Model No. 4 (AM 4)

competing models that represent truly different hypothetical alternative structural relationships, e.g., AM 1 (see Figure 3), AM 2 (see Figure 4), AM 3 (see Figure 5) and AM 4 (see Figure 6).

The comparative analysis of fit indices of alternative models (see Table II) depict that the Alternative Model No. 2 has shown the better fit, and hence, we hypothesize it as the best model of collaboration between downstream oil sector and auto-service sector. It suggests that environmental scanning is strongly related to external alignment which leads to strategic outcome or the advantage of collaboration. It is also established that internal alignment is not necessarily related to external alignment or strategic outcome.

We find that "AM 2" is the best alternative model to be used for testing the causal relationship significance, whose coefficients are shown in Table III.

The significant items identified in the best-fit model bring to light aspects of environmental scanning, external alignment and strategic outcome significant for collaboration between OMCs OCs (see Table III). Significant items for environmental

Goodness-of-fit statistics	Symbol	AM 1	AM 2	AM 3	AM 4
Chi-square test	χ^2	1,225.411	475.414	1,191.234	799.091
Degree of freedom	df	167	75	166	88
Chi-square/degree of freedom ratio	χ^2/df	7.338	6.339	7.176	9.081
Root mean square error of approximation	RMSEA	0.155	0.142	0.153	0.175
Turker-Lewis index	TLI	0.426	0.557	0.441	0.406
Normed fit index	NFI	0.515	0.653	0.529	0.544
Comparative fit index	CFI	0.544	0.683	0.558	0.564
Parsimonious normed fit index	PNFI	0.41	0.466	0.418	0.399

Table II. Results of fit indices for alternative models

			Estimate	SE	CR	p
EXTERNAL_ALIGNMENT	←	ENVIRONMETAL_SCAN	1.614	0.352	4.581	***
STRATEGIC_OUTCOME	←	EXTERNAL_ALIGNMENT	1.471	0.180	8.178	***
ENV_SCAN	←	ENVIRONMETAL_SCAN	1.000			
M_COMP	←	ENVIRONMETAL_SCAN	1.249	0.290	4.303	***
M_INF	←	ENVIRONMETAL_SCAN	2.396	0.451	5.316	***
M_OPP	←	ENVIRONMETAL_SCAN	1.818	0.385	4.724	***
EXT_ALIGN	←	EXTERNAL_ALIGNMENT	1.000			
SET_GOAL	←	EXTERNAL_ALIGNMENT	1.377	0.193	7.130	***
SH_RESOURCE	←	EXTERNAL_ALIGNMENT	0.648	0.163	3.966	***
ROLE	←	EXTERNAL_ALIGNMENT	1.233	0.191	6.473	***
SET_PROCESS	←	EXTERNAL_ALIGNMENT	1.677	0.219	7.643	***
CSAT	←	STRATEGIC_OUTCOME	1.199	0.121	9.941	***
TRUST	←	STRATEGIC_OUTCOME	1.008	0.109	9.279	***
PROFIT	←	STRATEGIC_OUTCOME	0.955	0.109	8.757	***
OUTCOME	←	STRATEGIC_OUTCOME	1.000			
UTILIZE	←	STRATEGIC_OUTCOME	0.962	0.099	9.729	***

Notes: Based on t-tests for null hypothesis, t-value greater than 1.96*** is significant at $p > 0.05$; t-value greater than 2.567** is significant at $p > 0.01$ and t-value greater than 3.29* is significant at $p > 0.001$

Source: Hatcher (1994)

Table III. Coefficients of the best-fit model

scanning have been obtained as relating to market for competition, influence and opportunity. Likewise, significant items for undergoing external alignment process have been obtained as setting common goals, sharing of resources, setting roles and responsibilities of partners and setting the collaboration process. Similarly, significant items for strategic outcome happen to be financial and non financial rewards, customer satisfaction, utilization of assets and knowledge and trust on partners.

7. Results and findings

From the analysis of the oil sector, it is found that there is a need for generation of NFR by the OMCs and on the other hand, the provisional analysis of auto-service sector reveals that the current auto-service market in passenger vehicle segment is projected to be INR440 billion by FY 2017-18 from the current estimate of INR280 billion (Bhattacharjee *et al.*, 2013). The major constraint for expanding the service network by OCs is very high real estate cost while the OMCs can provide the same very easily at their petrol pumps. While worldwide the share of NFR from petrol pumps is very high in developed countries even up to 39 per cent in USA, in India it is only about 1 per cent of the total revenues from this format of the business. This justifies the need of collaboration between OMCs and OCs sufficiently.

Theoretically, systematic and structured process for implementing collaboration has been the subject matter of strategic planning. This study has comprehensively and empirically validated this model of collaboration between OMCs of oil sector and OCs of auto-servicing sector. It has involved popular steps of making head start in implementing collaboration through strategic planning, which can be revisited by partners at any time.

The best-fit model has been identified as the Alternative Model No. 2 (AM 2) was multi-dimensional, which is the empirically justified model for implementing collaboration as an antecedent of strategic advantage. The best-fit model advises for valid collaboration between OMCs and OCs. Cumulative resources can be used fruitfully if and only if internal alignment process is not included for taking full advantage of capacity in addressing societal expectations. The omission of internal alignment process means identifying gaps in business process, human resource development to bring collaboration culture in the organization, setting up empowered selection team, selection of optimum partners and setting internal milestones are insignificant for implementing collaboration between OMCs and OCs leading ultimately to the strategic outcome.

8. Discussions

In the literature survey, it is noted that only the work of Bhattacharjee and Mohanty (2012) describes inter-firm collaboration model which can be adopted for collaboration between OMCs and OCs. But the model was not validated based on real life data. It was based on evaluation of various other models of collaboration. Other models depict only limited collaboration processes. The model of collaboration recommended in this research is an integrated model based on data generated through primary survey and validated through SEM process.

Given the economic climate of limited resources, increasing demands and complex societal expectations, it is important that collaboration responds to challenges of external alignment process, namely, setting common goal, sharing resources, having defined roles and responsibilities of partners and setting processes. That is, the external alignment process has to be placed at the heart of implementing collaboration between OMCs and OCs for achieving higher economic benefits.

As implementation of collaboration between OMCs and OCs can be revisited by partners at any time for development and change of resources over time, this research has successfully applied inter-firm relationship for resource-based advantage within a broader framework, which is in agreement with collaborating firms to drive towards a successful collaboration trailing extended RBV with following important practical implications:

- Practical implications for OMCs: the OMCs can improve their bottom-line, which is hit due to under-recovery in dealing of major fuels through their very large network of petrol pumps in the entire length and breadth of India. Towards the execution of external alignment process, OMCs may provide the civil infrastructure like shade, building, land and so on (Wasburn and Crispo, 2006).
- Practical implications for OCs: as multi-brand car service outlet at petrol pump is expected to be preferred for minor repair and routine maintenance, it gives a very strong signal to the OCs to increase their service network. The forming the external alignment process need to be taken properly by OCs based on their understanding of the collaboration lifecycle intending to strengthen leadership for providing equipment, labour, know how and the like dependably (see, e.g., Wasburn and Crispo, 2006).
- Scientific contribution: though collaboration has been widely researched area in the current century and many models have also been recommended, there is hardly any integrated model featuring all the major collaboration processes except that of Bhattacharjee and Mohanty (2012). There is also no empirical validation found of any of the models of collaboration. This study has developed the composite model and also validated empirically through SEM process. The approach can be referred in any future research on collaboration between any two sectors or organizations.

The approach in this research has shown to develop structural model of collaboration from measurement model depending on goodness-of-fit results and nomological validity. The method adopted in building this model can be used for developing and validating any other model of collaboration between any two companies in different sectors. The model can be adopted universally within a sector and across any two sectors. However, the linkages between the different collaboration process stages needs to be established through SEM.

9. Concluding remarks

This paper has explored the OMCs of the downstream Oil Sector and OCs of the auto-servicing sector in terms of their resources engaged in collaborative process. The study is based on factor analysis of environmental scanning items, which helps to establish well-formed goals relating to marketing forces applicable to the collaboration. It was conjectured that this perspective would throw light on right alignment options for strategic outcome after empirical validation using SEM.

This study has ascertained that a multi-brand car service outlet at petrol pump is expected to be preferred for minor repair and routine maintenance indicating OCs to increase their service network, which would eventually help the OMCs to improve their NFR. This study suffers from the limitation that it tests the fit of the model within the limits of Indian context only. In addition, it suffers from methodological limitations associated with convenience sampling and anonymous survey-based research. We find

that systematic, structured and validated process of strategic planning for implementing collaboration does involve following steps for making head start in its implementation:

(1) assessing need for collaboration;

(2) developing the shared vision (the direction), unique purpose (what is to be achieved) and the values and beliefs (the motivation) of the collaboration;

(3) assessing environmental factors of the market for collaborative capacities;

(4) establishing well-formed goals;

(5) examining and selecting best strategies; and

(6) developing a plan of action.

Conclusively it can be mentioned here that companies seeking to survive and thrive in the competition age must understand the connections between similar or diverse, and seemingly connected operations. They must know how to link apparently connected elements to create something new to maximize utilities for both. The case example described in this paper shows ample opportunities for strategic collaboration based on common interest. Our goal is to cultivate a collaborative ecology for the two sectors, which is self-sustaining, self-regenerating and adaptable to contemporary economic conditions. Strategic collaboration as depicted in this paper establishes formal inter-organizational relationships and cooperative arrangements between the two sectors represent a new organizational formation that seeks to attain fundamental objectives of business such as; profit, growth and survival.

This research included responses from managers of OMCs, managers of OCs, petrol pump dealers and passenger vehicle dealers using non-probability convenience sampling. The validation of the model of collaboration has been based on primary statistical survey data. Further, the model tested here does not test the set of sector level specific elements such as; coherent intent, congruent systems and capital for relationship building and learning; all of which support, reinforce and amplify the collaboration ecology.

This research has validated model for collaborative capacities between OMCs and OCs statistically through SEM using AMOS. Using longitudinal research with live data on the strategic outcome, simulations can be performed for making scenario planning. This model can also be validated on the basis of financial feasibility with respect to return on investment by conducting a few pilot collaborative projects.

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