A Survey of China's Pharmaceutical R & D Needs of the Pharmaceutical Technology Brokerage

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Abstract

Objective: To understand the demands for pharmaceutical technology brokers in China and provide a theoretical basis for its development.

Methods: Using the sampling method to survey university research organizations and pharmaceutical associations which have pharmacy major. And 480 valid questionnaires have been analyzed.

Results: Most respondents agree the application and industrialization of pharmaceutical projects are underdeveloped and pharmaceutical brokers are on a huge demand. They hope to form a standard pharmaceutical broker management system.

Conclusion: The pharmaceutical industry and the community should have a correct understanding of pharmaceutical brokers. Also it is proposed to strengthen its supervision, management, training, assessment and to quickly cultivate a group of excellent professionals to fill up the market gap.

Keywords: Pharmacy, R&D organization, Technological brokerage, Demand

1. Introduction

It is recorded in Blue Book for China's Pharmaceutical Market Development in 2009 that the gross output value of China's pharmaceutical industry increased form 7,900,000,000 yuan to 866,680,000,000 yuan during the period of reform and opening from 1978 to 2008. Particularly, in the latest ten years from 1999 to 2008, its development has gone beyond any other industry with its annual growth rate of 18.93%. However, problems cannot be ignored. For instance, on one hand, R&D staff is separate from market and therefore low technology transferring ratio; on the other hand, relevant enterprises' strong desire to improve their technological strength cannot be satisfied at the moment. Such a market with asymmetrical and insufficient information cries for an organization connecting R&D units and pharmaceutical manufacturing enterprises, that is technological brokerage for pharmaceutical industry. It is a pity that this title is seldom heard of nowadays, not to mention its function, value, legal status and role and so on. Accordingly, it seems quite necessary to carry on a survey on the demand for pharmaceutical technology brokerage in the development of China's pharmaceutical industry in order to provide guidance for the development of medical technology brokers in conformity to the current pharmaceutical trends in a more scientific and pointed way.

2. Subjects and Methods

2.1 Subjects

In this survey are included universities, R&D institutes and pharmaceutical associations with pharmacy major, those persons present at relevant pharmaceutical academic conferences in Shanghai, Beijing and Guangzhou as well as those responsible for some pharmaceutical projects in the three cities.

2.2 Methods

With 5 dimensions and 46 specific indicator systems included in this questionnaire, Likert's Five-spot Method is adopted, ranging from totally disagree, disagree, unsure, agree to totally agree which are assigned the value of 1 to 5 respectively. 1056 questionnaires were given to subjects who were chosen randomly on the internet, in the paper form or through Email from the end of March to the beginning of August of 2010. Finally, 498 ones were returned, 480 of which were valid, reaching a validity rate of 96.39%.

3. Results and Analysis

3.1 Basic Conditions of Subjects

As is shown in the analysis on 480 valid questionnaires, the chosen samples' gender, age, occupational and educational backgrounds are in basic conformity with demographic statistic features, hence quite representative. Details are given in Table 1.

3.2 Analysis on Chinese Pharmaceutical R&D Institutes' Demands for Technology Brokers

3.2.1 Pharmaceutical R&D Groups

Through our frequency analysis on five problems in pharmaceutical R&D groups with SPSS13.0, they have an average over 3.5. With principal component analysis employed, the first two common factors explain 85.842% of the information on the original 5 indicators. The first one has greater load in A2, A3 and A1, hence named as "age differentiation" factor while the second one has greater load in A5, hence named as "project undertaking" factor.

As is revealed in the analysis on the mean value and principle component, there are two major characteristics in China's current pharmaceutical R&D groups. First, age differentiation is quite serious. Young people with advanced educational backgrounds take up a large proportion while researchers around 50 years old are insufficient. On one hand, it is young people that fill R&D atmosphere with energy and passion, which will help to break those out-of-date custom during the R&D process and therefore to produce more achievements; on the other hand, insufficient middle-level forces also lead to inadequate R&D experience, management level and practical ability. Second, responsible persons need to undertake projects by themselves to help a whole group to survive. From some preliminary preparations to specific practice and to some after-service procedures, responsible persons are quite important in coordination and arrangement.

3.2.2 Pharmaceutical Projects

As is shown is frequency analysis, 7 items have an average value larger than 3 and one item less than 3. Analyzed with the principal component method, the first three common factors explain 76.874% of the information on the original 8 indicators. With its greater load in B6, B5 and B7, the first common factor is named as "cooperation and worry" factor; the second common factor is named as "market demand" factor with its greater load in B3 and B4; the third common factor is named as "non-market demand" factor with its greater load in B2; and the second and third common factors together reach a contribution rate of 42.298%. It is shown in further study that these two factors reflect the motivation for approving pharmaceutical projects. Therefore, they can be integrated into one as "project approval" factor.

According to the analysis on average value and principal component, there are two characteristics in current pharmaceutical project approval. First comes the motivation for pharmaceutical project approval, which is influenced by market demand factors and non-market demand ones. In most cases this motivation is guided by and based on market demand and only a minority of projects is entrusted by pharmaceutical manufacturers and some are approved according to national demand. Second, the dominance of worry over cooperation leads to impermanent cooperation of projects. During our interview, some responsible persons say that they undertake some projects in their own name in most cases and finish part of them first of all and then outsource the rest part to friends or enterprises, hence finishing the whole with joint efforts with higher rate of success. As for those projects they have no idea of, they might introduce them to friends with only information instead of continual follow-up service.

3.2.3 Application and Industrialization of Pharmaceutical Projects

As is shown in frequency analysis, all these factors have an average value greater than 3.5 and two ones even greater than 4. Through principal component analysis, the first three common factors explain 77.471% of the information on the original 9 indicators. The first common factor is named as the factor of "obstacles for pharmaceutical manufacturers" with its greater load in C8, C9 and C7; the second common factor is named as the factor of "credit crisis obstacles" with its greater load in C6 and C5; the third common factor is named as the factor of "obstacles for industrialization of technical achievements" with its greater load in C1 and C2.

There are three characteristics in China's application and industrialization of pharmaceutical projects through the analysis on average value and principle component. First come the obstacles for pharmaceutical manufacturers. Enterprises tend to refuse to invest more money after initial investment, leading to insufficient fund for R&D. Pharmaceutical manufacturers will break up with R&D institutes after gaining core technologies. Pharmaceutical research and development is characterized by high risk, high investment, high profit and long development term.

The huge sum of R&D cost and long process prevent pharmaceutical enterprises from persisting their supports for R&D groups. In 2005, the investment in pharmaceutical R&D in China amounted to $570,000,000, taking up only 1.02% of its sales income, while there were 10 large-scale international manufacturers had R&D expense over $270,000,000 (Sun, 2007). Compared with the R&D investment occupying 15% to 20% of their total income in foreign pharmaceutical enterprises, Chinese enterprises' 1% proportion seems pointless (Hu, 2005). What's worse, government gives no enough capital support for R&D as well. As is laid down in China's 863 Plan, there were 9 key projects started in 2006 with 326,590,000 yuan allocated by government as well as 55 tasks, each of which was supported by only 5,938,000 yuan. Thus, insufficient capital support from both pharmaceutical enterprises and government is a serious issue nowadays.

Second is the obstacle in credit crisis. In most cases, R&D groups and enterprises have doubt for each other. On one hand, R&D groups refuse to reveal their critical technology without being paid due to their worries about stolen technology; on the other hand, enterprise are not willing to pay before gaining the final achievements, hence wasting both sides' time and ending up with delayed tasks. At the initial stage of their cooperation, they tend to doubt each other, spy on information and sound out each other. However, with time passing by, their confidence and trust in cooperation might be increased with their comparison between both sides' performance and what they have expected (D. Lei, 1997). As a result, their reputation will be established through constant cooperation, which will then bring about new commercial value. Generally, both tend to trust each other after several cooperative attempts (Zhang, 2008). Once benefiting from keeping their promise in a long run, they will certainly choose to keep it (Zheng, 2003).

Third is the obstacle in the industrialization of technical achievements. Currently, most pharmaceutical researches are made for academic purposes instead of industrialization although researchers are really eager for that. According to a recent survey, among over 2000 achievements, only 8% of them have been industrialized and less than 3% of them have been on market. That is, a majority of them have been retained by enterprises rather than transferred into practical achievements (D. Lei, 1997). This is an important reason for the low industrialization level of technical achievements in pharmacy.

3.2.4 Current and Future Situation of Pharmaceutical Brokers

According to our frequency analysis, the average value of all items exceeds 3.5. In the principal component analysis, the former 6 common factors explain 83.522% of the original 19 indicators' information. The first common factor is named as "professional quality and occupational morality" factor due to their greater load in D8, D9, D10, D11 and D19; the second common factor is named as " market insight" factor due to its greater load in D4, D5 and D6; the third common factor is named as "commission" factor due to its greater load in D7; the fourth common factor is " cause" factor due to its greater load in D16; the fifth one is "reputation" and the sixth " part-time" due to their greater loads in D1 and D14 respectively.

As is shown in the above analysis, there are six features in the current and future development of Chinese pharmaceutical technology brokers. First, they are expected to have high professional quality and occupational morality. With professional quality, they will understand pharmaceutical projects and only with honesty will they guarantee their justified behavior during cooperation. In addition, they are expected to have right judgment on the value of technology and transfer it at a reasonable price. Second comes market insight. During our questionnaire survey and interviews, most respondents express their hope to have pharmaceutical brokers to get tasks, to have negotiations, to sign contracts, to have communications with manufacturers as well as deal with some other trifles for them. Therefore, for a broker of this kind, it is very important to make up and publicize projects, to communicate and negotiate with enterprises, to assess and evaluate projects and to sell projects at a desirable price. Third is commission. Most respondents say that they would like to pay brokers high commission (10%-20%) on the precondition that they really offer them substantial assistance. Fourth, due to the immature pharmaceutical technology brokerage in China, most people want to be part-time brokers. They would like to be part-time or full-time brokers later if they have time for that or after their retirement. Fifth, when asked about their reasons for being a pharmaceutical technology broker, most respondents want to take advantage of their professional knowledge, to help to transfer good technical achievements, to get in contact with more brokers which might help their own R&D, to have their achievements transferred or to change to the brokerage field to escape from R&D pressure if the pay is fine. Sixth is reputation. Currently, few people know about pharmaceutical technology brokers, having no idea about what they do. In their eyes, they cannot do anything except for offering information. Maybe they once got in touch with some agents to transfer their projects who are usually their friends or classmates. As a result, professional technology brokers seem not to be known by most people.

3.2.5 Prospect of Pharmaceutical Technology Brokerage

As is shown in our frequency analysis, the average value of all exceeds 4. And according to principal component analysis, the first two common factors explain 64.818% of the information of the original 5 indicators. The first common factor is named as "management system of pharmaceutical technology brokers" due to its greater load in E2, E3 and E1; the second one is named as "pharmaceutical project R&D service" due to its greater load in E5 and E4.

As is revealed in the above analysis, there are two features as to this aspect. First is pharmaceutical technology broker management system. Respondents call for a special institution, especially a government and folk combined one, to manage these brokers; they want a systematic training system to form a new occupation for pharmaceutical technology brokers who are enabled to hold certificates for their career and gain social recognition; they also want an all-round and timely information system to enable researchers to publicize information and learn about market demands. In conformity to current development of pharmaceutical technology brokerage in China, National Chinese Medicine Administrative Bureau and National Industrial and Commercial Administrative Bureau should have combining administration over them and their activities. Once getting mature, they can be managed by National Chinese Medicine Union, hence establishing a development mechanism for pharmaceutical technology brokers' monitoring, management, training and assessment and eliminating current disorder of pharmaceutical brokers and their activities. Second is service for pharmaceutical R&D, including having fixed brokers to serve pharmaceutical projects, forming a national organization to provide a dragon service. Through the cooperation among government, enterprises, universities and unions, we try to achieve an institutional operation for certification and training of pharmaceutical technology brokers, to from a complete system for certification, assessment, training and promotion, to improve these brokers' knowledge structure and overall quality, to establish high-quality brokerage personnel, hence offering technical talents for the long-term development of R&D institutions and enterprises, dividing their tasks in a proper way (R&D institutions paying attention to research while pharmaceutical enterprises devoting themselves to market expansion).

4. Conclusion

In our study, we collect indicators and data through literature analysis, semi-structurized interview and questionnaire survey as well as process them through frequency analysis, principal component analysis and variance analysis, among which frequency analysis reveals respondents' recognition degree in each question, principal component analysis further withdraws key questions and clears them up and variance analysis reveals no obvious differences lying in different working units, positions, educational backgrounds (most indicators have a significance level over 0.05 which is closely related to samples' education level and close relations with this industry). Further, we make our study and daw a series of conclusions on China's current demands for pharmaceutical technology brokerage, including serious age differentiation in research groups, responsible persons having to conduct tasks alone, constant credit crisis between research institutions and manufacturers as well as low industrialized transfer rate of research achievements. Therefore, there is an urgent demand for pharmaceutical technology brokers with some specific requirements for their overall quality and prospect for this industry as well.

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Table 1. Statistics of subjects' demographic features

Demographic features	Category	Number of subjects	Percentage	Demographic features	Category	Number of subjects	percentage
gender	Male	363	75.62	Working units	State-owned enterprises	111	23.12
	Female	117	24.38		Joint ventures	84	17.5
age	Below 18	3	0.62		Private enterprises	81	16.88
	18-25	69	14.38		Universities and research institutes	181	37.71
	26-35	156	32.5		others	23	4.79
	36-45	186	38.75	Education	High school or technical secondary school	22	4.58
	Over 46	66	13.75		Junior colleges or universities	153	31.88
Position	Enterprise leaders	22	4.58		Master's degree	146	30.42
	High-level administrators	85	17.71		Doctor's degree	159	33.12
	Medium-level administrators	53	11.04	Monthly income	3000 or below	8	1.67
	Grass-roots managers	85	17.71		3001-5000	83	17.29
	Researchers	182	37.92		5001-8000	125	26.04
	Pharmaceutical technology brokers	32	6.67		8001-10000	150	31.25
	Others	21	4.38		10000 or above	114	23.75