CHAPTER FOUR
RESULTS

The previous chapter presented the subjects, materials, and relevant procedures to collect and analyze the data. This chapter reports on data collected from the 70 respondents who were diagnostic laboratory managers. The findings were interpreted to form conclusions related to factors influencing purchasing decisions about clinical diagnostic products in medical laboratories. The information gathered from the questionnaires is shown in the appendix part of this independent study. The data was analyzed by using SPSS Version 12.0 and the analysis was divided into three parts based on the objectives of the study as follows:

4.1 Demographic information of respondents

4.2 Characteristics of purchasing behavior and work

4.3 Extent of Agreement with each issue about factors influencing purchasing decisions

The results of the research are presented in two parts. One is descriptive statistics and the other is statistical analysis.

4.1 THE RESULTS OF THE DEMOGRAPHIC INFORMATION OF RESPONDENTS

These parts were collected from section 1 of the questionnaires. All respondents were diagnostics laboratory managers who worked in government and private hospitals around the kingdom of Thailand. There were also two respondents who worked in a private laboratory in Bangkok. The results showed the demographic information of respondents such as sex, age, education, their workplace in terms of bed size and type of organization. The number of specimens/day is also included in this part. The results are presented below in the form of numbers and percentages in Tables 1-6. The information is explained below each table.

Table 1. Number and Percentage of the Respondents Categorized by Gender

Gender	Number	Percentage
Male	29	41.4
Female	41	58.6
Total	70	100.0

Table 1 presents a frequency analysis of the data for gender of respondents. The ratio of males to females sampled was 41.4% males and 58.6% females.

Table 2. Number and Percentage of the Respondents Categorized by Age

Age	Number	Percentage
Less than 31 years	7	10.0
31 – 40 years	31	44.3
41 – 50 years	21	30.0
More than 50 years	11	15.7
Total	70	100.0

Table 2 provides descriptive statistics on the age of the sampled diagnostic laboratory managers. The respondents ages between 31 - 40 totaled 44.3%. 30% of respondents were between the ages of 41-50. Only 10% of respondents were less than 31 years old. The majority of respondents had experience in the diagnostics laboratory of more than eight years after graduation. All of respondents were medical technologists.

Table 3. Number and Percentage of the Respondents Categorized by Educational Background

Educational Background	Number	Percentage
Bachelor's degree	58	82.9
Master's degree	11	15.7
Doctoral degree	1	1.4
Total	70	100

Table 3 represents the frequency analysis of the data indicating that the majority of diagnostic laboratory managers responding to the survey held Bachelor's degrees from the faculty of medical technology (82.9%). Educational data in Table 3 reveals that 15.7% of the respondents had completed their Master's degrees, while only 1.4% held Doctoral degrees.

Table 4. Number and Percentage of the Respondents Categorized by Organization

Kind of Organization	Number	Percentage
Government Hospital	44	62.9
Private Hospital	24	34.3
Private Laboratory	2	2.9
Total	70	100

Table 4 shows that the majority respondents were working in a government hospital (62.9%). The government hospitals in this survey were regional and provincial hospitals in Bangkok and upcountry from the north, northeast, central region, east and the south of Thailand. The respondents from private hospitals totaled 34.3% most of them located in Bangkok and big cities such as Chiangmai, Khonkaen, and Cholburi. Only 2.9% were from private laboratories based in Bangkok.

Table 5. Number and Percentage of the Respondents Categorized by Number of Beds

Number of Beds	Number	Percentage
No Beds	2	2.9
201 – 300 Beds	25	35.7
301 – 500 Beds	17	24.3
More than 501 Beds	26	37.1
Total	70	100

Table 5 shows that the most respondents worked in hospitals with more than 501 beds (37.1%) and 201 – 300 beds (35.7%). The number of beds is related to the size of the hospital and the number of patients admitted to the hospitals. Only 2.9% of respondents worked in private laboratories which provided blood collection, analyzed blood and sent the results to the walk-in patients.

Table 6. Number and Percentage of the Respondents Categorized by Number of Specimens/Day

Number of Specimens/Day	Number	Percentage
100 – 200 tubes	23	32.9
201 – 300 tubes	19	27.1
301 – 400 tubes	10	14.3
401 – 500 tubes	6	8.6
More than 501 tubes	12	17.1
Total	70	100

Table 6 shows that most of the respondents (32.9%) handled 100 – 200 specimens per day, followed by 201 –300 specimens per day (27.1%). Some of respondents handled more than 501 specimens per day (17.1%). Respondents who used automated instruments with higher throughput handled a higher number of specimens.

4.2 THE ANALYSIS ON THE PURCHASING BEHAVIOR OF RESPONDENTS

These parts were collected from section two of the questionnaire, which is related to the purchasing behaviors of the diagnostic laboratory managers. The questions included the frequency and period of instrument replacement, sources of product information, and reasons for replacing products or maintaining current products. All respondents ranked their preferences on the last three questions to indicate their purchasing behaviors. The results are presented below in the form of numbers and percentages in Tables 7-10. The information is explained for each table.

Table 7. The frequency and period of instrument replacement

Frequency and Period of Instrument Replacement	**Number**	**Percentage**
Every year	0	0.0
2 – 3 years	14	20.0
4 – 5 years	32	45.7
More than 5 years	24	34.3
Total	70	100

Table 7 shows that the majority (45.7%) of the respondents replaced their chemistry or immunology analyzers with new instruments every 4-5 years, while 34.3% of the respondents replaced their analyzers after 5 years. There was no definite period for laboratory managers to change analyzers. Some reasons were an increasing workload, finding new advanced technology, or dissatisfaction with the current suppliers' services. Regarding Table 7, none of respondents replaced their analyzers every year.

Table 8. Rank of sources of product information

Sources of product information	Number	Percentage
Being informed by sales reps.	36	51.4
Attending meetings or seminars	22	31.4
Asking other labs	5	7.1
Searching internet	7	10.0

Table 8 shows that 51.4% of respondents were informed about the products information by sales-representatives, while 31.4% of respondents received product information by attending both local and international exhibitions, seminars and symposiums. Only 10% of respondents researched product information from the Internet and 7.1% received product information from reference laboratories.

Table 9. Lists of reasons why the respondents changed products or suppliers

Reasons for changing products or suppliers	Number	Percentage
Policy and regulations	5	7.0
Increase of specimens or running new tests	19	26.8
Need to reduce costs	4	5.6
Pioneer for new technology	4	5.6
Unsatisfied with services of current company	3	4.2
Need to follow reference lab	1	1.4
Short expiration or package too big	1	1.4
Inaccurate results	33	46.5
Promotions from company	1	1.4
Educational support from company	1	1.4
Others (space for installation of the instruments)	1	1.4

Table 9 shows the main reasons for changing the products or suppliers was due to inaccurate results (46.5%). Good quality results leads to correct diagnosis and

successful treatment of patients, which is important to a hospital's image. An increasing number of specimens or need to run new tests (26.8%) were the second ranked reasons for changing products or suppliers. While other reasons such as the customers' policy, cost reduction or being the pioneer for new technology were less important in the respondents' views.

Many laboratories changed their products or suppliers while some customers continued using the current products for many years. Some laboratories rarely changed their suppliers. The reasons why customers remained loyal to their current products and suppliers were interesting and are shown below:

Table 10. Rank of reasons for remaining with current suppliers

Reasons for remaining with current suppliers	Number	Percentage
Reasonable price	4	5.7
No substitute product	5	7.1
Confidence in result	54	77.1
Satisfied with after sales services and education	4	5.7
Good relationship with sales reps. and company	1	1.4
High switching cost	1	1.4
Others (just changed the instruments)	1	1.4

Based on Table 10, the biggest reason (77.1%) respondents continued using the current suppliers or products was confidence in the results. Some of the respondents (7.1%) replied that the lack of a substitute product was the main reason for them to continue using the current products or suppliers. This suggests that the laboratory managers were concerned about the quality of products as other reasons were less important (such as price, relationship and high switching cost when replacing with new instruments).

4.3 THE ANALYSIS ON THE AGREEMENT OF EACH ISSUE ABOUT FACTORS INFLUENCING PURCHASING DECISIONS OF RESPONDENTS

This part of the questionnaire is related to factors influencing purchasing decisions about clinical diagnostic products in medical laboratories. The questions were divided into 6 parts which included the important factors in terms of products, price, sales representatives, promotion, company & executives and after sales services (compose of product specialists, engineers and delivery of products). All respondents ranked their preferences on each factor via a 5-point Likert Scale. The results are presented below in the form of number, percentage, mean and rank in Tables 11-17. The results are discussed as follows:

4.3.1 Product Factors

The product is one of the marketing stimuli, which enters the buyer's awareness. A product is anything that can be offered to a market to satisfy a want or need. This part of the questionnaire (items 11 – 26) asked the respondents to rank their preference on the features and benefits of the products. Most of factors were related to ease of use, up-to-date technology and the effectiveness of the product such as the throughput of the analyzer, quality performance of assay, ready to use reagent, time to first result, ability to run STAT sample, ability to use pediatric samples, ability to link with laboratory information system (LIS), number of reagents on board, ability to run with other suppliers' reagent, low consumption of water and electricity, ease of maintenance, up-to-date technology and the durability of instruments. The results are shown in Table 11.

Table 11. Number, Percentage, Mean and Rank of the Respondents Categorized by influencing factors related to products

Products	Most influential (5)		Very influential (4)		Moderately influential (3)		A little influential (2)		Least influential (1)		Mean	Rank
	F	P	F	P	F	P	F	P	F	P		
11. Throughput of the analyzer	18	25.7	48	68.6	4	5.7	0	0	0	0	4.20	10
12. Quality of assay performance (sensitivity, specificity, accuracy, precision and linearity)	61	87.1	9	12.9	0	0.0	0	0.0	0	0.0	4.87	1
13. Ready to use reagent	27	38.6	39	55.7	4	5.7	0	0.0	0	0.0	4.32	7
14. Time to first result	23	32.9	45	64.3	2	2.9	0	0.0	0	0.0	4.30	8
15. Ability to run STAT samples anytime	24	34.3	36	51.4	10	14.3	0	0.0	0	0.0	4.20	10
16. Compact size of analyzers	9	12.9	19	27.1	35	50.0	6	8.6	1	1.4	3.41	15
17. Small samples size for pediatric specimens	13	18.6	36	51.4	21	30.0	0	0.0	0	0.0	3.89	13
18. Ability to link with LIS	26	37.1	38	54.3	5	7.1	1	1.4	0	0.0	4.27	9
19. Number of reagents on board	17	24.3	41	58.6	12	17.1	0	0.0	0	0.0	4.07	12
20. Open systems which can run other suppliers' reagents	3	4.3	25	35.7	29	41.4	9	12.9	4	5.7	3.20	16
21. Low consumption of water electricity and other supply	12	17.1	36	51.4	20	28.6	1	1.4	1	1.4	3.81	14

(table continues)

Table 11. (continued)

Products	Most influential (5)		Very influential (4)		Moderately influential (3)		A little influential (2)		Least influential (1)		Mean	Rank
	F	P	F	P	F	P	F	P	F	P		
22. Ease of use and training	28	40.0	37	52.9	5	7.1	0	0.0	0	0.0	4.33	5
23. Ease of maintenance and timeliness	27	38.6	39	55.7	4	5.7	0	0.0	0	0.0	4.33	5
24. New technology with continuous research and development	35	50.0	32	45.7	3	4.3	0	0.0	0	0.0	4.46	3
25. Long shelf life of reagents	30	42.9	34	48.6	6	8.6	0	0.0	0	0.0	4.34	4
26. Durability of analyzers and few service calls/year	39	55.7	28	40.0	2	2.9	1	1.4	0	0.0	4.50	2

Table 11, shows the most influential factors for purchasing decisions of respondents were quality of assay performance in terms of sensitivity, specificity, accuracy, precision and linearity (4.87)(87.1%), the durability of analyzers and few service calls/year (4.50)(55.7%) and new technology with continuous research and development (4.46)(50.0%). While the least influential factors were open systems which can run on any other suppliers' reagent (3.20)(4.3%), compact size of analyzers (3.41)(12.9%) and the low consumption of water, electricity and other supply (3.81)(17.1%).

4.3.2 Price Factors

Beside the products, price was also a major determinant of buyer's decisions. Although non-price factors have become more important in recent decades, price still remains one of the most important elements determining market share and profitability. Customers continuously pressure sellers to lower their prices. This part

of the questionnaire (items 27-31) asked the respondents to rank their preference on issues related to price in terms of good value for money, price included all accessories, special discounts for volume, free reagent kit during installation period and special discount if the customers purchase meet minimum requirements from the suppliers. The results are shown in Table 12.

Table 12. Number, Percentage, Mean and Rank of the Respondents Categorized by factors related to price

Price	**Most influential (5)**		**Very influential (4)**		**Moderately influential (3)**		**A little influential (2)**		**Least influential (1)**		**Mean**	**Rank**
	F	**P**	**F**	**P**	**F**	**P**	**F**	**P**	**F**	**P**		
27. Good value for money	42	60.0	27	38.6	1	1.4	0	0.0	0	0.0	4.59	1
28. Price includes all accessories	33	47.1	34	48.6	3	4.3	0	0.0	0	0.0	4.43	2
29. Special discount for large group of check up samples	15	21.4	31	44.3	19	27.1	5	7.1	0	0.0	3.80	4
30. Free reagent kit during the installation and training period	23	32.9	29	41.4	16	22.9	2	2.9	0	0.0	4.04	3
31. Special discounts after achieving minimum requirements from the company	15	21.4	32	45.7	18	25.7	4	5.7	1	1.4	3.80	4

Table 12 shows that good value for money (4.59)(60.0%), price included all accessories (4.43)(47.1%) and a free reagent kit during the installation and training period (4.04)(32.9%) were the most influential price factors for purchasing decision of the respondents. A special discount for volume and achievement of minimum

requirements by the company were the least important factors to the respondents (3.80)(21.4%).

4.3.3 Sales representatives Factors

Sales representatives play a vital role in the buying process as the clinical diagnostic products are industrial goods, which impact a patient's life. Good sales representatives serve as the company's personal link to the customers. They are able to analyze their customer's needs, convince customers to purchase their products instead of their competitors, and able to communicate the features, and benefits of their products to their customers. They also can strengthen relationships and make their customers to be their partners, which enables to maintain and expand their business. This part of the questionnaire (items 32-42) asked the respondents to rank their preference on the issues related to sales representatives' characteristics and behaviors such as the frequency of customer visits, product knowledge, selling skills, presentation skills, the way they communicated to customers, the difficulty of contact, and their experience and responsiveness. The results are shown in Table 13.

Table 13. Number, Percentage, Mean and Rank of the Respondents Categorized by factors related to sales representatives

Sales Representative	**Most influential (5)**		**Very influential (4)**		**Moderately influential (3)**		**A little influential (2)**		**Least influential (1)**		**Mean**	**Rank**
	F	P	F	P	F	P	F	P	F	P		
32. Frequency visits	15	21.4	34	48.6	21	30.0	0	0.0	0	0.0	3.91	9
33. Product knowledge, selling skills and presentation skills	27	38.6	40	57.1	3	4.3	0	0.0	0	0.0	4.34	4
34. Easy to contact	41	58.6	28	40.0	1	1.4	0	0.0	0	0.0	4.57	2
35. Responsiveness	48	68.6	22	31.4	0	0.0	0	0.0	0	0.0	4.69	1
36. Clear communication	21	30.0	46	65.7	3	4.3	0	0.0	0	0.0	4.26	6

(table continues)

Table 13. (continued)

Sales Representative	Most influential (5)		Very influential (4)		Moderately influential (3)		A little influential (2)		Least influential (1)		Mean	Rank
	F	P	F	P	F	P	F	P	F	P		
37. Ethical and honest	30	42.9	39	55.7	1	1.4	0	0.0	0	0.0	4.41	3
38. Friendliness and politeness	18	25.7	51	72.9	1	1.4	0	0.0	0	0.0	4.24	7
39. Smart and clean attire	10	14.3	47	67.1	13	18.6	0	0.0	0	0.0	3.96	8
40. Loyalty to the company	9	12.9	44	62.9	15	21.4	2	2.9	0	0.0	3.86	11
41. High experience	10	14.3	44	62.9	14	20.0	2	2.9	0	0.0	3.89	10
42. Listen to customers	25	35.7	39	55.7	6	8.6	0	0.0	0	0.0	4.27	5

As show in Table 13, the respondents ranked the importance of sales representatives in terms of service and responsiveness (4.69)(68.6%), ease of contact (4.57)(58.6%) and ethics and honesty (4.41)(4.29%). The loyalty to the company (3.86,12.9%), the working experience of sales representatives (3.89)(14.3%) and the frequency of visiting (3.91)(21.4%) were the least important factors.

4.3.4 Promotional Factors

Sales promotion is a key ingredient in marketing campaigns, consisting of a collection of incentive tools, mostly short term, designed to stimulate quicker or greater purchases of particular products or services by customers. This part of the questionnaire (items 43-45) asked the respondents to rank their preference on the issues related to promotional factors such as the frequency of launching promotional campaigns, the free gimmicks during exhibitions and the support at international exhibitions and symposiums. The results are shown in Table 14.

Table 14. Number, Percentage, Mean and Rank of the Respondents Categorized by factors related to promotions

Promotions	**Most influential (5)**		**Very influential (4)**		**Moderately influential (3)**		**A little influential (2)**		**Least influential (1)**		**Mean**	**Rank**
	F	**P**	**F**	**P**	**F**	**P**	**F**	**P**	**F**	**P**		
43. Frequently launched promotional campaigns	11	15.7	37	52.9	20	28.6	2	2.9	0	0.0	3.81	1
44. Free gimmicks during the exhibitions	5	7.1	15	21.4	41	58.6	7	10.0	2	2.9	3.20	3
45. Support for International exhibitions and symposiums	11	15.7	29	41.4	24	34.3	4	5.7	2	2.9	3.61	2

As shown in Table 14, the most influential promotional factor was the frequency of launching promotional campaigns (3.81)(15.7%), followed by support for international exhibitions and symposium attendance (3.61)(15.7%). Free gimmicks during exhibitions (3.20)(7.1%) were the least influential promotional factor.

4.3.5 Company & Executive Factors

Company and executives of the company also influenced customers' behavior. The background, reputation, vision, mission, and philosophy of all executives of the company were of concern to the customers. All of this defines the business direction, marketing strategy and the way that the company does business. This part of questionnaire (items 46-52) asked the respondents to rank their preference on issues related to company and executive factors such as the brand and image, the frequency of new product launching, the research and development of new products, the stability and reputation of the company, the ways that the executives communicated to the customers, teamwork, as well as transparency, and ethics. The results are shown in Table 15.

Table 15. Number, Percentage, Mean and Rank of the Respondents Categorized by factors related to company & executives

Company & Executives	**Most influential (5)**		**Very influential (4)**		**Moderately influential (3)**		**A little influential (2)**		**Least influential (1)**		**Mean**	**Rank**
	F	**P**	**F**	**P**	**F**	**P**	**F**	**P**	**F**	**P**		
46.World class brand & image	9	12.9	43	61.1	17	24.3	1	1.4	0	0.0	3.86	6
47. Frequency of new product launchings	7	10.0	24	34.3	36	51.4	3	4.3	0	0.0	3.50	7
48. Science leadership and focus on continuous R&D of new products	19	27.1	45	64.3	6	8.6	0	0.0	0	0.0	4.19	5
49. Reputation	22	31.4	43	61.4	5	7.1	0	0.0	0	0.0	4.24	3
50. Listen to customers' requirements and complaints	37	52.9	32	45.7	1	1.4	0	0.0	0	0.0	4.51	1
51. Work as a team	17	24.3	51	72.9	2	2.9	0	0.0	0	0.0	4.21	4
52. Work with transparency, and ethics under a code of business conduct	22	31.4	4	65.7	2	2.9	0	0.0	0	0.0	4.29	2

Table 15 shows that the way that executives of the company communicated to customers by listening customers' requirement and complaints (4.51)(52.9%), the way the executives worked with transparency, ethics and followed a business code of conduct (4.29)(31.4%) and the stability and reputation of the company (4.24)(31.4%) were the most influential factors for purchasing decisions by respondents. The frequency of new product launchings (3.50)(10.0%), a world-class image (3.86)(12.9%) and science leadership in terms of continuous research and development (4.19)(27.1%) were less important factors to the respondents.

4.3.6 Service Factors

A service is any act or performance that one party can offer to another that is essentially intangible. Its production may or may not be tied to a physical product. Services always deal with human resources and responsibilities and in this survey the services included the performance of product specialists who assisted the customers in troubleshooting and training, the performance of engineers who fixed and maintained the analyzers and the delivery of products to the customers. This part of questionnaire (items 53-60) asked the respondents to rank their preferences on issues related to service regarding delivery of products, the accuracy of invoices, frequency of shortages and expiration of products, fast response to problems, engineering skill, 24 hour 7 day service, frequency of product knowledge updating and ability to provide back up units. The results are shown in Table 16.

Table 16. Number, Percentage, Mean and Rank of the Respondents Categorized by factors related to services (product specialists, engineers and delivery)

Services (Product specialists, Engineers, Delivery)	**Most influential (5)**		**Very influential (4)**		**Moderately influential (3)**		**A little influential (2)**		**Least influential (1)**		**Mean**	**Rank**
	F	**P**	**F**	**P**	**F**	**P**	**F**	**P**	**F**	**P**		
53. On time reagent delivery	46	65.7	22	31.4	2	2.9	0	0.0	0	0.0	4.63	2
54. Accuracy of invoices	35	50.0	34	48.6	1	1.4	0	0.0	0	0.0	4.49	4
55. Frequency of product shortages and back orders	32	45.7	32	45.7	3	4.3	3	4.3	0	0.0	4.33	6
56. Fast response to problems	50	71.4	18	25.7	1	1.4	1	1.4	0	0.0	4.67	1
57. Engineering skill and ability to fix the instruments within a short time	45	64.3	23	32.9	2	2.9	0	0.0	0	0.0	4.61	3

(table continues)

Table 16. (continued)

Services (Product specialists, Engineers, Delivery)	**Most influential (5)**		**Very influential (4)**		**Moderately influential (3)**		**A little influential (2)**		**Least influential (1)**		**Mean**	**Rank**
	F	**P**	**F**	**P**	**F**	**P**	**F**	**P**	**F**	**P**		
58. Ability to provide 24 hour and 7 day service	36	51.4	24	34.3	9	12.9	1	1.4	0	0.0	4.34	5
59. Frequency of updating diagnostic knowledge	15	21.4	45	64.3	9	12.9	1	1.4	0	0.0	4.06	8
60. Ability to provide back up units	23	32.9	40	57.1	6	8.6	1	1.4	0	0.0	4.20	7

Table 16 reveals that fast response to problems (4.67)(71.4%), on-time reagent delivery (4.63)(65.7%), ability to fix the instruments within a short time and engineer's skill (4.61)(64.3%) were the most influential factors for purchasing decisions. The frequency of product knowledge updating (4.06)(21.4%), the ability to provide back up units (4.20)(32.9%) and the frequency of product shortages (4.33)(45.7%) were the least important factors.

4.3.7 Overall Factors

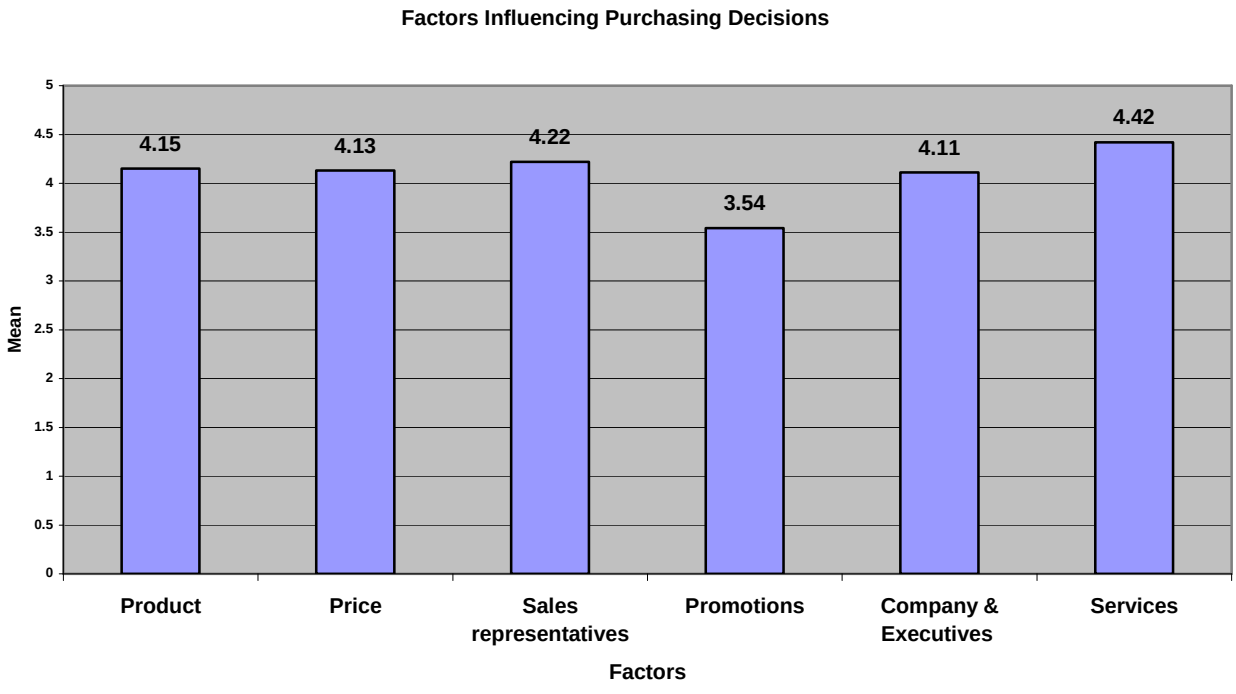
Finding the mean and rank of each factor is useful for the overview of the results of the survey. The results were categorized by product, price, sales representatives, promotions, company & executives and services to get a big picture of the overall factors as shown in Table 17 and Figure 5.

Table 17. Mean and Rank of the Respondents Categorized by influencing factors

Influencing Factors	Mean	Rank
Product	4.15	3
Price	4.13	4
Sales representatives	4.22	2
Promotions	3.54	6
Company & Executives	4.11	5
Services	4.42	1

Table 17 shows that service factors (4.42) and sales representatives' factors (4.22) were the most influential factors on purchasing decisions of respondents. Product factors (4.15) were slightly more influential than price factors (4.13) while the promotion factors (3.54) and the company and executives factors (4.11) were the least influential. Figure 5 shows a clearer comparison between each factor in terms of convenience and ease compared to all the factors in the same dimension.

Figure 5. Mean and rank of the respondents categorized by influencing factors.



From this survey, it's obvious that the three most important factors influencing purchasing decisions about clinical diagnostic products in medical laboratories were service factors, sales representatives factors and product factors. Promotions were the less influential factor among the six factors. Therefore, all the diagnostic laboratory companies and suppliers need to offer excellent service, professional sales representatives and high quality products to their customers. This will result in the growth and success of the company. The findings of the study will be summarized and discussed in the next chapter.