Factors determining the post-patent entry of generic medicines in Malaysia: A survey of the Malaysian generic pharmaceutical industry

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Factors determining the post-patent entry of generic medicines in Malaysia: A survey of the Malaysian generic pharmaceutical industry

Omotayo Fatokun¹,², Mohamed IM Ibrahim³ and Mohamed A Hassali¹

Abstract
Malaysia is reliant on the availability of generic medicines to contain the rising national pharmaceutical expenditure. This paper assesses the factors determining the market entry of a new generic medicine following patent expiration on the innovator product in Malaysia. Data were gathered by using mail survey approach. The pre-validated Likert-scale questionnaire was mailed to all licensed members of the Malaysian Organization of Pharmaceutical Industries. A usable response rate of 53.8% (14/26) was achieved following four successive mailings. The overall internal reliability coefficients for the 5-item entry decision variables scale and 11-item entry barrier variables scale were 0.62 and 0.82 respectively. The results revealed that the major factors driving decisions to develop and introduce a new generic medicine into the Malaysian pharmaceutical market are consistent with the business model of the generic pharmaceutical industry. The pre-patent expiration market value of the innovator product was found to be a significant factor influencing entry decisions for domestic market-oriented generic firms as compared with export-oriented firms ($Z = -2.36$, $p = 0.01$). Foremost among the barriers to new generic medicines development and market introduction in Malaysia were patent clustering by innovator firms and the earlier market entry of imported generic medicines. There is a need for strict adherence to the patentability criteria in the examination and grant of pharmaceutical patents in Malaysia, and coherence in policies related to local generic drug development and production is recommended in order to meet the policy objectives of drug affordability and containment of pharmaceutical cost.

Keywords
Patent expiration, generic medicines, generic entry, barriers, Malaysia

Introduction
Malaysia relies on the availability of generic medicines following patent expiration on innovator products to contain the rising pharmaceutical expenditure in its highly subsidized public health care sector and reduce the burden on the out-of-pocket paying consumers in the private health care sector.¹,² However, the possibility of a generic medicine becoming available following patent expiration on the innovator product is dependent on various factors that a generic pharmaceutical firm has to take into consideration. Indeed, the entry decision process is complex.³ The literature is replete with empirical discussions on several determinants and factors driving or impeding the entry of generic medicines.³–⁹ Yet, in Malaysia, little has been reported on this phenomenon, despite the country’s strong patent protection system, proliferation of pharmaceutical patents and dependence on generics availability.¹⁰–¹²

The literature indicates that post-patent entry of generic medicines is affected by the market characteristics, behaviour of innovator companies and the existence of incentive structures that promote generic development and production by the generic industry.⁴–⁶,⁸,¹³,¹⁴ In sum, the market entry of generic medicines following patent expiration is highly dependent

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on factors that are either internal or external to a potential generic drug entrant.

This paper, a part of a larger research, therefore, aim to assess the factors influencing decisions to develop and introduce a new generic medicine into the Malaysian pharmaceutical market and identify the barriers to post-patent entry of generic medicines in Malaysia, from the perspective of the Malaysian generic drug manufacturers.

Methods

This study was a cross-sectional national survey using a self-completed anonymous Likert-scale questionnaire. The potential items that form the “universe of content” for the survey questionnaire were generated using information derived from the comprehensive review of relevant literature. These items were then developed into an initial survey questionnaire, following the suggestions in the literature on item scaling and anchoring. In general, the items were made comprehensible and unambiguous. Validity of the questionnaire was established using expert review and a field evaluation by potential respondents. The initial questionnaire was subjected to format, layout and face validity by two faculty members with expertise in survey research and possesses in-depth knowledge of the Malaysian generic pharmaceutical industry, after which necessary modifications were made. The final questionnaire was evaluated by two generic drug manufacturers for content validity and clarity of the questionnaire items to ensure the questionnaire items reflected issues relevant to the Malaysian generic medicines industry. The final questionnaire assessing the entry variables consisted of two sections. The first section consisted of 5 items assessing the factors influencing decisions by generic manufacturers to develop and introduce a new generic medicine into Malaysian pharmaceutical market on a 5-point Likert scale of 1 = not strong to 5 = very strong. The second section consisted of 11 items assessing barriers to post-patent entry of new generic medicines into Malaysian pharmaceutical market on a 5-point Likert scale of 1 = least significant to 5 = most significant. There was a last section containing questions on respondent’s engagement in generic manufacturing and the market sector of generic sales.

Study participants

Selection criteria

Potential study participants were restricted to pharmaceutical companies engaged in the development and production of prescription generic drugs in Malaysia, on the justification that generic development and production is a necessary step in the entry process of generic medicines following patent expiration of innovator drug products.

Sampling

To achieve a reproducible sample and to ensure the relevance of the sample to the research objectives, the sampling frame was the 2009 list of members of the Malaysian Organization of Pharmaceutical Industries (MOPI) licensed by the Malaysian Drug Control Authority to manufacture prescription pharmaceutical products (“poisons”) in Malaysia. MOPI comprises all major pharmaceutical manufacturers in Malaysia and are mainly engaged in generic drug development and production. MOPI member list was obtained from the organization website (www.mopi.org.my) and their licensure status obtained from the Malaysian pharmaceutical control bureau website (www.bpfk.gov.my). As at 2009, there were 32 members of MOPI. However, only 26 of the MOPI members were licensed manufacturers of prescription pharmaceutical products in Malaysia, thus representing the study sampling unit. The entire sampling unit of 26 licensed members of MOPI represents the sample for this study.

Survey administration

First, an advanced letter of introduction was sent to the president of the MOPI informing its members of the planned survey and to prepare the potential respondents for the survey. Following this advanced letter, the final validated questionnaire, with a cover letter and a self-addressed postage paid return envelope, were mailed to all the 26 licensed members of the MOPI. The cover letter which was one page long, easy to read and printed on institutional letter head, included the purpose and importance of the study, and request for their response to the questionnaire. The questionnaire also contains the name and telephone number of a person to contact in case the respondents have any questions about the study. The mails were sent between January 2010 and April 2010 through the firms’ respective managing directors or chief executive officers. To increase the response rate, after the initial mailing in January 2010, the set of questionnaire materials (a cover letter and a self-addressed postage paid return envelope) were again mailed to non-responders, identified through earlier pre-coding, three times over 3 months, namely, February 2010, March 2010 and April 2010. Follow-up telephone calls were made to
non-responders in June and July 2010. Data collection was kept open until 31 December 2010, in order to maximise any opportunity for increased responses.

Data analysis

Statistical data analysis was performed using SPSS Statistics version 20 (IBM Corporation). Data analysis included reliability analysis for the summed multi-items variables, descriptive measures, Friedman test and Mann-Whitney U test. Non-parametric tests were chosen given the ordinal nature of the survey items in this study.\(^{24}\) The level of statistical significance was set at \(p < 0.05\).

Results

Out of the 26 questionnaires mailed to the entire potential respondents, a total 17 firms returned the questionnaire, giving an overall response rate of 65.4% (17/26). However, three of the respondents indicated that they do not manufacture prescription-generic medicines, hence were considered unusable and therefore excluded for further analysis. Thus, a usable response rate of 53.8% (14/26) was achieved following four successive questionnaire mailings. The non-responders that were reachable on telephone follow-ups indicated that they were either “busy” or “do not engage in surveys.”

Non-response bias analysis

Potential non-response bias to the survey was investigated following response wave analysis approach by comparing early responders with late responders.\(^{25,26}\) Participants who required more reminders before they participated were non-respondents if the data collection had stopped earlier. If there are no significant differences between the early and late responders on the outcome variables, then it is assumed that non-response bias is unlikely to affect the results of the study responders.\(^{25,26}\) Therefore, late responders were used as a proxy for non-responders in estimating non-response bias.\(^{27}\) The early and late responders were grouped, coding the first 7 (50%) respondents as “1” and the last 7 (50%) respondents as “2”; and comparing them on all outcome measures and firms characteristics using Mann-Whitney U test.\(^{27,28}\) The result shows that there was no significant difference between the early and late responders for any of the 26 variables under investigation. Thus, suggesting that non-response bias is unlikely to have a significant effect on the study findings.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>N (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Major market sector</td>
<td></td>
</tr>
<tr>
<td>Domestic market</td>
<td>11 (78.6)</td>
</tr>
<tr>
<td>Export market</td>
<td>2 (14.3)</td>
</tr>
<tr>
<td>Missing data</td>
<td>1 (7.1)</td>
</tr>
<tr>
<td>Period since generic manufacturing</td>
<td></td>
</tr>
<tr>
<td>More than 10 years</td>
<td>13 (92.9)</td>
</tr>
<tr>
<td>Between 5 and 10 years</td>
<td>–</td>
</tr>
<tr>
<td>Less than 5 years</td>
<td>–</td>
</tr>
<tr>
<td>Missing data</td>
<td>1 (7.1)</td>
</tr>
<tr>
<td>Location of manufacturing site(^a)</td>
<td></td>
</tr>
<tr>
<td>Northern region</td>
<td>6 (42.9)</td>
</tr>
<tr>
<td>Central region</td>
<td>6 (42.9)</td>
</tr>
<tr>
<td>Southern region</td>
<td>2 (14.3)</td>
</tr>
</tbody>
</table>


Reliability analysis

In this study, Cronbach’s alpha was calculated for the multiple-item summed scales: The 5-item scale on “factors influencing decisions to develop and introduce a new generic medicine into Malaysian pharmaceutical market” and the 11-item scale on the “barriers to post-patent entry of new generic medicines entry into Malaysian pharmaceutical market” of the questionnaire. The result shows an overall reliability coefficient of 0.62 and 0.82 for the 5-item and 11-item scales respectively.

Factors influencing decisions to develop and introduce a new generic medicine into the Malaysian pharmaceutical market. The descriptive statistics of the results obtained is shown in Table 2. Most of the respondents indicated that the study variables are strong or very strong factors in influencing decisions to develop and introduce a new generic drug into the Malaysian pharmaceutical market, collectively ranging from 57.1% to 85.5%. The majority of the respondents (85.8%, \(n = 12\)) viewed the market size of the
innovator product before patent expiration as either a strong or very strong factor influencing decisions to develop and introduce a new generic drug into the Malaysian pharmaceutical market. Equal proportions of the respondents (64.3%, \( n = 9 \)) perceived anticipated cost of probable legal challenge from innovator firms and cost of development and approval as either strong or very strong factors. Based on the mean score, the market size of innovator product before patent expiration also had the highest mean score (mean = 4.14, SD = 1.03), followed by compatibility of the new generic medicines with company product portfolio (mean = 3.64, SD = 1.2); and the time to develop and obtain marketing approval had the lowest mean score (mean = 3.36, SD = 1.34).

The differences in mean rankings across the five study variables were further assessed using the Friedman ANOVA test. The results show that the market size of the innovator product before patent expiration was ranked highest (mean rank = 3.75) as a factor influencing decisions to develop and introduce a new generic medicine into the Malaysian pharmaceutical market, followed by compatibility of the new generic medicines with company product portfolio (mean rank = 3.04). Anticipated cost of probable legal challenge had the lowest mean rank score (mean rank = 2.64). However, the differences in mean rank scores across the variables were not significant (\( \chi^2(4, N = 14) = 5.482, p = 0.24 \)).

### Differences between domestic-market oriented and export-market oriented generic firms across the entry decision variables

The Mann-Whitney U test was used to compare the rankings of the entry decision variables between the two major market sectors of generic sales: “domestic market” and “export market”. The result is presented in Table 3. A cursory examination of Table 3 revealed differences in the ranking of the variables by the two groups of generic manufacturing firms. For instance, the “market size of the innovator product before patent expiration” was ranked highest (mean rank = 8.00) by domestic-market oriented firms, but this variable was ranked fourth (mean rank = 1.5) by export-market oriented generic firms. Conversely, the “length of time to develop and obtain marketing approval” was ranked highest (mean rank = 7.50) by export-market oriented generic firms, but this variable was ranked lowest (mean rank = 6.91) by domestic-market oriented firms. However, the inferential statistical analysis using Mann-Whitney U test revealed that market size of innovator product before patent expiration is the only variable among all the 5 variables that is statistically different (\( U = 0.0, Z = -2.36, p = 0.01 \)) between domestic-market oriented generic firms and export-oriented generic firms. The mean rank score (8.00) of “market size of innovator product before patent expiration” for firms which domestic market constitute a major part of their generic sales is significantly higher than the mean rank score (1.50) for firms that export market constitute a major part of their generic sales. This finding thus indicates that market entry of innovator product is a significant factor influencing decisions by domestic-market oriented generic firms to develop and introduce a new generic medicine into the domestic market

### Table 2. Frequency and mean score ranking of the factors influencing decisions for generic development and market entry

<table>
<thead>
<tr>
<th>Study variables</th>
<th>Frequency (%)</th>
<th>Total, N (%)&lt;sup&gt;a,b&lt;/sup&gt;</th>
<th>Mean score&lt;sup&gt;c&lt;/sup&gt; (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anticipated cost of probable legal challenge</td>
<td>3 (21.4) 0 (0.0) 2 (14.3) 6 (42.9) 3 (21.4)</td>
<td>14 (100)</td>
<td>3.43 (1.45)</td>
</tr>
<tr>
<td>Compatibility of the new generic medicines with company product portfolio</td>
<td>1 (7.1) 2 (14.3) 1 (7.1) 7 (50.0) 3 (21.4)</td>
<td>14 (100)</td>
<td>3.64 (1.2)</td>
</tr>
<tr>
<td>Cost of development and approval</td>
<td>1 (7.1) 4 (28.6) 0 (0.0) 5 (35.7) 4 (28.6)</td>
<td>14 (100)</td>
<td>3.50 (1.40)</td>
</tr>
<tr>
<td>Length of time to develop and obtain marketing approval</td>
<td>1 (7.1) 4 (28.6) 1 (7.1) 5 (35.7) 3 (21.4)</td>
<td>14 (100)</td>
<td>3.36 (1.34)</td>
</tr>
<tr>
<td>Market size (sales) of the innovator product before patent expiration</td>
<td>0 (0.0) 2 (14.3) 0 (0.0) 6 (42.9) 6 (42.9)</td>
<td>14 (100)</td>
<td>4.14 (1.03)</td>
</tr>
</tbody>
</table>

1: Not strong; 2: somehow strong; 3: neutral; 4: strong; 5: very strong.
<sup>a</sup>Valid percent.
<sup>b</sup>Row percentages have been corrected to the nearest one decimal place and total percentage may not add to exactly 100%.
<sup>c</sup>Based on a 5-point strength scale ranging from “not strong” (scored as 1) to ”very strong” (scored as 5).
the Malaysian pharmaceutical market, as compared with export-market oriented generic firms.

**Barriers to post-patent entry of generic medicines.** Table 4 reports the descriptive statistics on the ranking by the responding generic firms on the study entry barrier variables. In general, the respondents indicated that the variables are moderately significant to most significant as barriers to post-patent entry of generic medicines into the Malaysian pharmaceutical market, ranging collectively from 69.3% to 100%. The majority of the respondents (78.6%, n = 11) indicated that early market entry of imported generic medicines constitute either a significant or most significant entry barriers to generic medicines; and a high proportion of the respondent (71.4%, n = 10) indicated that the use of patent cluster by innovators represents significant or most significant entry barriers to generic medicines. Based on the mean score, the use of patent cluster by innovators and early market entry imported generic medicines had the highest mean scores. Although the mean score for use of patent cluster by innovators (mean = 4.07, SD = 0.83) is statistically higher than that for early market entry of imported generic medicines (mean = 4.07, SD = 0.73) given the larger standard deviation the former. The deployment of second and subsequent medical use claims by innovators had the lowest mean score (mean = 3.21, SD = 1.05).

The differences in mean rankings across the 11 study variables were assessed using the Friedman ANOVA test. The results presented in Table 5 show that the use of patent clusters by innovators was ranked highest as a barrier to post-patent entry of generic medicines into the Malaysian pharmaceutical market (mean rank = 7.96). This is followed by early entry of imported generic medicines (mean rank = 7.75) and market launch of second generation/follow-on patented products by innovators (mean rank = 7.14). Second and subsequent medical use claims by innovators had the lowest mean rank score (4.75). The Friedman test shows that the differences in mean rank scores across the variables were significant ($\chi^2 (10, N = 14) = 18.829, p = 0.04$). To examine where the significant differences lies between the 11 variables, a post-hoc pair-wise comparisons were conducted using the Wilcoxon signed ranks test.

As presented in Table 6, the result shows that the mean rank scores of both the use of patent clusters and early marker entry of imported generic medicines are significantly higher than the mean rank scores of delay in the process of regulatory marketing approval, the non-availability of raw materials due to patent or other exclusivity, second and subsequent medical use claims by innovators and shifting consumer demands with marketing campaigns by innovators. Additionally, earlier market entry by imported generic medicines is significantly higher than market launch of generics by the innovator or its licensee or agents and launching of second generation/follow-on patents by innovators is significantly higher than second and subsequent medical use claims by innovators. No other differences in mean rank scores were significant. In general, this result suggests that the use of patent clusters by innovator firms and early market entry of imported generic medicines significantly differ from the other variables as barriers to post-patent entry of generic medicines in the Malaysian pharmaceutical market, although the observed significant differences might be limited by
Table 4. Frequency and mean score ranking of the barriers to post-patent entry of generic medicines into the Malaysia pharmaceutical market

<table>
<thead>
<tr>
<th>Study variables</th>
<th>Frequency (%)</th>
<th>Total, N (%)&lt;sup&gt;a,b&lt;/sup&gt;</th>
<th>Mean score&lt;sup&gt;c&lt;/sup&gt; (SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost associated with drug development and regulatory approval</td>
<td>0 (0.0)</td>
<td>14 (100)</td>
<td>3.50 (0.86)</td>
</tr>
<tr>
<td>Delay in the process of regulatory marketing approval</td>
<td>0 (0.0)</td>
<td>14 (100)</td>
<td>3.29 (0.99)</td>
</tr>
<tr>
<td>Earlier market entry by imported generic medicines</td>
<td>0 (0.0)</td>
<td>14 (100)</td>
<td>4.07 (0.73)</td>
</tr>
<tr>
<td>Financial agreement and settlements by innovator companies with generic manufacturers</td>
<td>2 (14.3)</td>
<td>14 (100)</td>
<td>3.29 (1.49)</td>
</tr>
<tr>
<td>Market launch of generics by the innovator or its licensee or agents</td>
<td>0 (0.0)</td>
<td>14 (100)</td>
<td>3.50 (1.09)</td>
</tr>
<tr>
<td>Launching of second generation/follow-on patents by innovators</td>
<td>0 (0.0)</td>
<td>14 (100)</td>
<td>3.86 (1.03)</td>
</tr>
<tr>
<td>Non availability of raw materials due to patent or other exclusivity</td>
<td>0 (0.0)</td>
<td>14 (100)</td>
<td>3.36 (1.01)</td>
</tr>
<tr>
<td>Patent-related litigation and disputes</td>
<td>0 (0.0)</td>
<td>14 (100)</td>
<td>3.57 (1.22)</td>
</tr>
<tr>
<td>Second and subsequent medical use claims by innovators</td>
<td>0 (0.0)</td>
<td>14 (100)</td>
<td>3.21 (1.05)</td>
</tr>
<tr>
<td>Shifting consumer demands with marketing campaigns by innovators</td>
<td>0 (0.0)</td>
<td>14 (100)</td>
<td>3.43 (0.94)</td>
</tr>
<tr>
<td>Use of Patent cluster by innovators</td>
<td>0 (0.0)</td>
<td>14 (100)</td>
<td>4.07 (0.83)</td>
</tr>
</tbody>
</table>

1: Least significant; 2: less significant; 3: moderately significant; 4: significant; 5: most significant.

<sup>a</sup>Valid percent.
<sup>b</sup>Row percentages have been corrected to the nearest one decimal place and total percentage may not add to exactly 100%.
<sup>c</sup>Based on a 5-point significance scale ranging from “least significance” (scored as 1) to “most significance” (scored as 5).

Table 5. Mean rank scores of study variables by respondents on barriers to entry using the Friedman test<sup>a</sup> [N = 14]

<table>
<thead>
<tr>
<th>Study variable</th>
<th>Mean rank&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Friedman Test&lt;sup&gt;c&lt;/sup&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Use of Patent cluster by innovators</td>
<td>7.96</td>
<td>18.829, p = 0.04&lt;sup&gt;d&lt;/sup&gt;</td>
</tr>
<tr>
<td>Earlier market entry by imported generic medicines</td>
<td>7.75</td>
<td></td>
</tr>
<tr>
<td>Launching of second generation/follow-on patents by innovators</td>
<td>7.14</td>
<td></td>
</tr>
<tr>
<td>Patent-related litigation and disputes</td>
<td>5.96</td>
<td></td>
</tr>
<tr>
<td>Cost associated with drug development and regulatory approval</td>
<td>5.82</td>
<td></td>
</tr>
<tr>
<td>Financial agreement and settlements by innovator companies with generic manufacturers</td>
<td>5.68</td>
<td></td>
</tr>
<tr>
<td>Market launch of generics by the innovator or its licensee or agents</td>
<td>5.29</td>
<td></td>
</tr>
<tr>
<td>Non availability of raw materials due to patent or other exclusivity</td>
<td>5.29</td>
<td></td>
</tr>
<tr>
<td>Shifting consumer demands with marketing campaigns by innovators</td>
<td>5.25</td>
<td></td>
</tr>
<tr>
<td>Delay in the process of regulatory marketing approval</td>
<td>5.11</td>
<td></td>
</tr>
<tr>
<td>Second and subsequent medical use claims by innovators</td>
<td>4.75</td>
<td></td>
</tr>
</tbody>
</table>

<sup>a</sup>Listed in mean rank order from the highest to lowest.
<sup>b</sup>Based on a 5-point significance scale ranging from “least significance” (scored as 1) to “most significance” (scored as 5).
<sup>c</sup> Sig. (2-tailed)
<sup>d</sup> Significant difference, p < 0.05.
type 1 error commonly encountered in multiple statistical comparisons.29

**Difference between domestic-market oriented generic firms and export-market oriented generic firms across the variables on entry barriers.** The Mann-Whitney U test was used to compare the rankings of the variables between the two major market sectors of generic sales: “domestic market” and “export market”. The result presented in Table 7 revealed some differences in the ranking of the variables by the two groups, for instance, while the “cost associated with drug development and regulatory approval” and “delay in the process of regulatory marketing approval” were ranked highest by export-market oriented generic firms, these variables were ranked lowest by domestic-oriented generic firms. However, Mann-Whitney U test revealed no significant difference in mean ranking of the variables between the two groups. Thus, suggesting that from the perspective of both domestic-market oriented and export-oriented generic firms, all the variables are of relevance as barriers to post-patent entry of generic medicines in Malaysia.

**Discussions**

The overall response rate of 65.4% (usable 53.8%) achieved in this study following four successive mailings is considered satisfactory, given the typically low response rates to mail surveys among organizations and top industrial executives.30–32 The response rate in this study is comparable to “only a handful” of response to mailed questionnaire reported in an earlier study carried out among Malaysian pharmaceutical firms.10 Similarly, response rate of 52% was achieved in a related study among top executives of
pharmaceutical firms in Greece. Furthermore, consistent with the responses obtained from the follow-up telephone calls of non-responders in this study, the reasons for lack of response to questionnaire by top industrial executives have been attributed to being busy, reluctance to provide information about their firms, lack of interest in the study or firms’ policy against returning questionnaire. However, analysis of non-response bias in the present study indicates that non-response is unlikely to have significant effects on the study findings.

Majority of the responding firms in this study have been manufacturing generic medicines in Malaysia for over 10 years, an indication of a long period of experience in the generic pharmaceutical industry and hence ability to adequately provide valid judgment on the issues investigated through the survey. The result of this study shows that Malaysian domestic market constitutes a major part of the sales of the Malaysian generic manufacturing industry. This finding agrees with earlier studies that reported that the Malaysian local pharmaceutical industry’s production is mainly intended for domestic consumption. 

### Table 7. Differences between generic market sectors on study variables using Mann-Whitney U test (N=13)²

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost associated with drug development and regulatory approval</td>
<td>6.64</td>
<td>9.00</td>
<td>7.0, -0.873, p=0.58</td>
<td></td>
</tr>
<tr>
<td>Delay in the process of regulatory marketing approval</td>
<td>6.64</td>
<td>9.00</td>
<td>7.0, -0.838, p=0.45</td>
<td></td>
</tr>
<tr>
<td>Earlier market entry by imported generic medicines</td>
<td>6.68</td>
<td>8.75</td>
<td>7.5, -0.765, p=0.63</td>
<td></td>
</tr>
<tr>
<td>Financial agreement and settlements by innovator companies with generic manufacturers</td>
<td>6.91</td>
<td>7.50</td>
<td>10.0, -0.202, p=0.92</td>
<td></td>
</tr>
<tr>
<td>Market launch of generics by the innovator or its licensee or agents</td>
<td>7.00</td>
<td>7.00</td>
<td>11.0, 0.000, p=1.00</td>
<td></td>
</tr>
<tr>
<td>Launching of second generation/follow-on patents by innovators</td>
<td>6.95</td>
<td>7.25</td>
<td>10.5, -0.104, p=0.96</td>
<td></td>
</tr>
<tr>
<td>Non availability of raw materials due to patent or other exclusivity</td>
<td>6.91</td>
<td>7.50</td>
<td>10.0, -0.205, p=0.92</td>
<td></td>
</tr>
<tr>
<td>Patent-related litigation and disputes</td>
<td>7.05</td>
<td>6.75</td>
<td>10.5, -0.102, p=1.00</td>
<td></td>
</tr>
<tr>
<td>Second and subsequent medical use claims by innovators</td>
<td>6.91</td>
<td>7.50</td>
<td>10.0, -0.205, p=1.00</td>
<td></td>
</tr>
<tr>
<td>Shifting consumer demands with marketing campaigns by innovators</td>
<td>7.05</td>
<td>6.75</td>
<td>10.5, -0.108, p=1.00</td>
<td></td>
</tr>
<tr>
<td>Use of Patent cluster by innovators</td>
<td>7.09</td>
<td>6.50</td>
<td>10.0, -0.211, p=1.00</td>
<td></td>
</tr>
</tbody>
</table>

²Total number of responses on “major market sector” questionnaire question [one firm did not respond].
ᵇBased on a 5-point significance scale ranging from “least significance” (scored as 1) to “most significance” (scored as 5).
ᶜSig. (2-tailed).

Factors influencing decisions to develop and introduce a new generic medicine into the Malaysian pharmaceutical market

The descriptive findings of this study revealed that the market size of the innovator products prior to patent expiration is the foremost factor influencing the decision of generic manufacturers to develop and introduce a new generic medicine into the Malaysian pharmaceutical market. This finding is consistent with the business model of the generic industry and with literature findings on determinants of generic entry in the pharmaceutical industry. Several empirical studies have revealed that pre-expiration sales revenue of innovator products is a major determinant of generic entry, as this serves as an attraction to generic manufacturers to invest in the production and introduction of a new generic version in anticipation of profits that might be derived from the new generic drug. Although no significant differences were seen between all the variables used in this study, the market size of innovator products before patent expiration was a significant variable between domestic-oriented generic firms and export-oriented generic
firms as a variable influencing decision to develop and introduced a new generic medicine into the Malaysian pharmaceutical market. The domestic-oriented firms ranked this variable significantly higher than imported-oriented firms among all the variables. In other words, pre-patent expiration market size of innovator product significantly influenced the decisions of domestic-oriented firms than export-oriented firms in developing and introducing a new generic drug into the Malaysian pharmaceutical market. This findings is found consistent with basic economic and marketing concept which suggest that a firm decision to produce and supply a given product is driven by the its target market with the desire to earning the maximum profit. In addition, the literature indicates that generic industry depends largely on the local market conditions. Thus, the domestic-market oriented firms are significantly driven by the pre-patent market value of the innovator product as compared with export-oriented generic firms.

Another important variable driving decisions to develop and introduce a new generic product into the Malaysia pharmaceutical market is the cost of generic development and approval. This variable is related to the sunk cost needed to be incurred by a potential generic entrant before entry can take place. Although the cost of generic development is lower compared to innovator product, but because generic medicines typically enter the market at lower price, the size of the sunk cost is important as these costs are invariably irrevocable. Hence, generic firms must determine if their expected post-entry returns are sufficient to justify the costs sunk prior to entry. Though, the cost of generic drug approval in Malaysia appear reasonable when compared with other developing countries, the costs related to generic drug development and bioequivalence studies has been seen as a challenge to Malaysian local generic manufacturers, especially the smaller firms. Even as expressed by a key representative of the Malaysian generic industry: “...We struggle with R&D to develop generic products that have been selling in India or Vietnam or Indonesia for the last 10 years and yet we still spend that [RM = Ringgit Malaysia] 400,000 developmental cost, [RM] 80,000 BE etc. So, there are a lot of inefficiencies in the market” (personal communication).

A closely related factor that is of prominence in influencing decisions in generic development and entry in the Malaysian pharmaceutical industry is the compatibility of the new generic drug with the existing firm’s products portfolio. This finding found support in prior studies that show that a firm’s existing technical capabilities, products portfolio and specialization predict the firm’s market entry with a new product as the cost of entry is reduced. This notion is also consistent with the economic principle of comparative advantage that suggests that firms will chose to concentrate in what they can produce with the highest relative efficiency given all the other products that could be produced. This finding in the Malaysian generic industry may therefore be premised on the basis of the industry effort to maximize efficiency given the low economies of scale in the Malaysian generic industry, and the challenges currently faced by the Malaysian generic industry in product development, bioequivalent testing and meeting the regulatory requirements for new generic products, a situation that may be made compounded if the new product requires the acquisition of technical capability and resources that may be different from the existing ones. Thus, a generic manufacturer may only decide to develop and introduce a new generic drug within a certain therapeutic class or in certain dosage form that is compatible with their existing technical capability or product portfolios they specialise in as they would benefit from economies of scale or scope in production and help decrease firm’s fixed costs.

Taken together, this study revealed that generic entry decisions in Malaysia are driven by factors consistent with the entry model of the generic pharmaceutical industry, which is the development at a minimal cost, a generic equivalent to an “economically successful” innovator product and market it as soon as the innovator product patent expires.

**Barriers to entry of new generic medicines**

The results of this study shows that the use of patent cluster by innovators, earlier market entry by imported generics and the market lunch of follow-on patented products by innovators were the major entry barriers to generic medicines in Malaysia. The use of patent cluster and earlier entry by imported generics being the most significant among all the variables assessed in this study. These findings find support in the literature which revealed that patent clustering (acquisition of multiple patents surrounding the basic patents of the drug products) and follow-on patenting (otherwise called patent “evergreening” or “secondary patents”) by innovator firms are predominant in the pharmaceutical industry and commonly used to deter generic entry. For example, an investigative survey of the European pharmaceutical industry revealed that many of the commercially important drug products (blockbusters) are surrounded by multiple patents with the aim of creating uncertainty and ambiguities as to the patent status of the drug product, thus impeding the entry of generics. Similarly, a report in neighbouring Thailand shows that the practice of extending a...
drug’s patent term through multiple patenting is prevalent. Though the assessment of the extent of patent clustering in Malaysia was not examined in this study, our findings indicated from the perspective of generic manufacturers that patent clustering is a major barrier to entry and availability of new generic medicines in the Malaysian pharmaceutical industry.

Another major barrier to market of generic medicines in Malaysia, from the perspective of local generic industry, is the earlier market entry of imported generic medicines. This finding supports Hassali et al., which identified competition from imported generics as one of the challenges to the domestic generic industry. Generally, in the generic drug market, the “earlier entrants” (or “incumbent generics”) assume a pioneering advantage (early mover advantage) in the market and tend to have a sustained market share which may create a disincentive for subsequent entrants. This situation arises because consumers and providers are unwilling to incur switching cost for switching to the “late entrants.” On this, Hollis (p724) asserted: “While patients may accept the first generic on the market because it is less expensive than the brand name product, they are unwilling to be switched again to yet another product that does not offer any cost-saving and given that it is costly for the pharmacist to switch current patients from one generic to another, the pharmacy is locked into carrying the same generic indefinitely”.

Given that early mover advantage depends on the strength of prevailing barriers to entry, therefore, between imported generics and locally manufactured generics, the time to market entry and the resulting early mover advantage would be a function of the extent of the entry barriers faced by the two categories of generics. In other words, if imported generics face lesser barriers to enter as compared to local generics, imported generics are more likely to enter first. While there seems to be no significant delay in regulatory approval in Malaysia as shown from the findings of this present study (ranked 10th), a prior study suggested that imported generics find it easier to enter the Malaysian pharmaceutical market because limited barriers to their entry exist due to trade policy initiatives and the burden of generic drug development locally, particularly in conducting bioequivalent studies.

Although some variability in ranking of the variables assessed in this study was seen between domestic-oriented and export-oriented generic firms, no significant differences in the ranking of the variables between the two groups, thus suggesting that, to both groups, all the variables are relevant as potential barriers to market entry of generic medicines in Malaysia. This finding is not unexpected, as all generic manufacturers, irrespective of their target market, are exposed to the same factors related to generic medicines development, production and regulatory approval requirements, which are crucial steps in the post-patent entry process of generic medicines.

Study limitations

Although the response rate achieved in this study is consistent with what has been reported in the literature, the inability to obtain response from all the study potential respondents despite repeated mailings and telephone calls was a challenge. To address this limitation, a response wave analysis was carried out and the results revealed that no significant difference exist between early and late responders on all the study variables of interest. However, because late non-responders are only “proxy” non-responders, their being similar to responders does not conclusively indicate an absence of nonresponse.

Conclusion

This study revealed that the major factors driving decisions to develop and introduce a new generic medicine into the Malaysian pharmaceutical market are pre-patent expiration market value of the innovator product, cost of generics development and the compatibility of the new generic medicine with the firms’ existing products range. However, the Malaysian generic industry faces some impediments to introduce a new generic medicine into the market because of a number of entry barriers. Foremost among these is the use of the patenting strategies particularly patent clustering by innovator companies, which may create ambiguities on the patent status of the innovator product and thus make the generic manufacturers uncertain of when to produce and enter the market or else risk costly patent litigations. Another prominent barrier to local generic manufacturers is the market competition from the imported generics which seem to have early mover advantage in the generic market.

Policy implications and recommendations

Impediments and entry barriers to generic medicines have implications for drug affordability and accessibility, particularly in Malaysia where there is a high proportion of out-of-pocket payment for medicines. The impediment or blockade of entry and availability of low-cost generic medicines would imply that consumers have to rely on costly innovator branded products or depend on imported generics, which may not offer a sustainable cost advantage and also reduces the competitiveness in the domestic generic manufacturing industry.
While the value of the patent system is indisputable as it engenders innovation and development of new drug products, the system should not be allowed to be used to hinder access to needed medicines. Therefore, in order to meet the policy objectives of increased availability of generic medicines and drug affordability for the benefits of the consumers and the government, strict adherence to the patentability criteria in the examination pharmaceutical patents is recommended. It is also recommended that trade-related policy coherence and enhanced capacities in the local generic drug development be improved.

Suggestions for further studies

The findings of this study point to a possible future research on the actual extent of entry-deterrent practices in Malaysia, with particular focus on patentrelated strategic behaviours of innovator firms.

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Conflict of interest

The authors declare that they have no competing interests.

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