

**An Investigation into Decision-making Processes and Criteria
for In-licensing Currently Used at Boehringer Ingelheim:
Evaluation and Recommendations**

by

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Abstract

In-licensing is the activity whereby pharmaceutical companies acquire rights on compounds from other companies. Thus, in-licensing complements own research and development.

Some of the processes of in-licensing are similar to those of project appraisal and decision-making. In-licensing has, however, so far not been researched much in practice.

Therefore, this project set out to examine two key areas of in-licensing at Boehringer Ingelheim (BI), an international pharmaceutical company:

- the history of 1990-1995 in-licensing decision making at Boehringer Ingelheim and the results in retrospect (through a systematic stock-taking of documented decisions into the pharmaceutical licensing document, PLD)
- the current (1996/1997) process of decision-making in in-licensing prescription drugs at the Business Area Conference (BAC) and the International Steering Committee (ISC), (through a decision maker questionnaire, DMQ)

The PLD showed that while decisions at BI were frequently correct in accepting promising compounds or rejecting others that looked less favourable, this resulted in a high percentage of rejections of - as it later turned out - commercially favourable projects.

The DMQ showed that BI decision-makers are certain that most of such decisions have been correct. They use the criteria of strategic fit, likelihood of success, and commercial value differently when they accept or reject proposals. In general, they rate the decision preparing assessment papers as acceptable but not excellent, and they find not infrequently that decisions should better have been postponed because of that. They agree on the usefulness of quantitative evaluation methods. There is a wide-spread feeling that in-licensing overall needs to be improved but not necessarily expanded. Based on these findings, the following recommendations are given:

a) decision preparation

- in-licensing processes should be improved and documented to a uniform standard

- the identification of in-licensing opportunities should be systematised
- evaluation in-house should be thoroughly planned
- the structure, content, and responsibilities of assessment and decision papers should be standardised and upgraded
- in-licensing should be made an integral part of the pharma strategy
- business opportunity teams should be fostered and trained appropriately

b) decision making

- decisions should be minuted, including rejection decisions that do not reach the level of top decision-making bodies (Business Area Conference, BAC; International Steering Committee, ISC)
- decision-making should be concentrated in the BAC

c) learning

- decision makers should be given a regular feedback on the consequences („correctness“) of their decisions
- in-licensing audits should be prepared regularly, at least once a year, as one measure to increase in-licensing efficiency

Preface

The field work for my dissertation originated from my work as a member of the Corporate Medical Division in the Project Ethical Pharmaceuticals (PEP) at BI which aimed at speeding up sales growth by a systematic search for business opportunities, in particular in-licensing.

Having gone through discussions on „lost opportunities“ and having seen some of the problems on the side of the decision making bodies when such business opportunities were presented, I decided to look deeper into the subject.

It was obvious that it was difficult to estimate the correctness of decisions given the long development process of drugs. Therefore it was necessary to go several years back in history where documentation was not as advanced as it is nowadays at BI. Due to little fluctuation in the Business Development (BD) Division in past years, some information could be supplemented by interviews with its members if it was not comprehensively minuted somewhere.

To investigate decision processes it turned out that this information could not come from minutes, but only from interviews or from questionnaires. I chose the questionnaire as it allows the decision maker to complete it without external interference or bias. There was no precedent to this, and in some cases, the procedure had to be explained and argued for.

I should like to thank the sponsors of this work, Dr. Hans Peter Gieseler, Head of Corporate Division Business Development, and Dr. Dr. Andreas Barner, Head of Corporate Division Medicine, for their constant support, suggestions and the openness regarding information. In particular, I am obliged to the members of Dr. Gieseler`s Division for sharing information and „opening the books“ as well as telling me where some information could be obtained from.

I thank the members of the BAC and ISC at BI who gave open, clear answers to the questionnaire.

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List of abbreviations

BAC	Business Area Conference
BD	Business Development
BI	Boehringer Ingelheim
BOT	Business Opportunity Team
CFO	Chief Financial Officer
DCF	Discounted cash flow
DMQ	Decision maker questionnaire
GmbH	Gesellschaft mit beschränkter Haftung (equivalent of plc in Great Britain)
HBR	Harvard Business Review
IMS	Institute of Medical Statistics (provides drug databases)
ISC	International Steering Committee
NPV	Net present value
PLD	Pharmaceutical Licensing Document
R&D	Research and Development
Rx	Prescription (business)
RD Focus	(Pharmaceutical magazine on drugs under research and development)
S.D.	Standard deviation
SBU	Strategic business unit
SCRIP	(Pharmaceutical Weekly)
WACC	Weighted-average cost of capital

1 Background

Pharmaceutical companies develop, manufacture, and distribute drugs.^{1, 2} They have, in general, two ways to arrive at new products: they can invent them by using their own research and development capacity from the beginning on, or they can acquire them at different stages of development from other companies or institutions such as universities. If this is for one substance at a time (or a concept), this is normally called in-licensing. If a broader type of co-operation is sought, these agreements take on the form of strategic alliances, or, if the entire company is acquired, an acquisition of new development compounds (and/or marketed products).

As with the decision to develop own compounds, such in-licensing decisions are economically speaking, investment decisions under uncertainty.³

The pharmaceutical industry has been rather slow with the formalisation of such decisions and the use of standardised techniques.^{4,5} An exception is Merck where Judy Lewent as the CFO (Chief Financial Officer) introduced the options pricing method in the 1980s.⁶

¹ Some companies do only one or two of these activities

² Allary and Sully (1996)

³ Duelli et al. (1991)

⁴ Faulkner (1996)

⁵ Roberts (1994)

⁶ Nichols (1994)

2 Objective for the project

At Boehringer Ingelheim (BI), no review of in-licensing activities has taken place to audit the performance of this function which heavily draws on several disciplines like R&D, medicine, marketing, and finance. With in-licensed products gaining more and more importance for revenue growth ⁷, an optimisation of in-licensing is an important goal for any pharmaceutical company. From the performance in earlier years and the responses of relevant decision makers, a definition of „in-licensing efficiency“ will be attempted.

Besides the negotiation process itself, the preparation of in-licensing decisions and the decision making itself are key processes. The acceptance or rejection of a business opportunity strongly depends on the technical and financial analysis, and of their translation into a negotiation strategy and contract building.

The project undertook the task to look into these key processes at BI. Such processes have been documented, their outcomes have been evaluated, and recommendations have been developed.

2.1 Project Licensing Document (PLD)

All „early“, i.e. clinical developments between the beginning of clinical phase I (trials in healthy volunteers) and the end of phase III (definitive clinical trials in large populations, for approval as a drug) have been evaluated retrospectively for 1990-1995 as far as they concerned prescription drugs and the licensing territory was „international“, i.e. more than one or a few countries. Using a standardised format, common parameters thought to be relevant for decision making were collected.

The following questions were to be answered:

1. What kind of evaluations were conducted and how did they contribute to decision making?
2. Which parameters usually were critical for positive/negative decisions?
3. When were decisions made with reference to the time the opportunity first came up?

⁷ SCRIP (1997)

4. How frequently were the correct/wrong decisions taken, and how can this be evaluated financially?

The aim was to have an objective measure of BI's quality of in-licensing and what could have contributed to „omitting“ real opportunities. A sample of the PLD can be found in appendix A.

2.2 Decision Maker Questionnaire (DMQ)

The attitudes of the decision makers greatly shape the type of decisions.⁸ At BI, main decisions are taken by two committees. The Business Area Committee (BAC) which meets every other week does the everyday business and takes decisions on in-licensing (for major investments, like down payments, the Board must be consulted as well, but it has never rejected a BAC proposal). The International Steering Committee (ISC) gets involved if BI internal resources are needed for development which is frequently the case when small partner companies are involved with early projects. It meets 4-6 times per year.

The composition of the committees is given in appendix D.

Therefore, a questionnaire serves to elucidate these attitudes, insights, and proposals regarding in-licensing and find areas of improvement, but also the certainty about decisions and the criteria for a positive or negative vote were asked.

This survey intended to help to see

1. What kind of criteria they usually apply and how similar those are between committee members and members of different committees
2. How they value the decision preparation and where they see room for improvement
3. How they view the current performance of the in-licensing function

This may have been the first survey of a high ranking group involved in in-licensing decisions in a pharmaceutical company. It remains to be seen whether this questionnaire could become not only an instrument for diagnosis but also for continuing measurement. A sample of the DMQ can be found in appendix B.

⁸ Ellul and Reeves (1996)

3 Objective for the dissertation

While the project undertakes the task to look into past decisions and current decision processes at BI, the dissertation will look how project appraisal and decision making could be optimised in a more general way, and it will develop recommendations.

It will focus on modelling and on quantitative techniques that may help the decision-makers to increase their ratio of „correct“ decisions. Therefore, different techniques for capital investment appraisal will be discussed and compared.⁹ In addition, methods of decision analysis will be applied to in-licensing problems.^{10, 11}

The criteria are the theoretical validity, the likelihood to arrive at „correct“ decisions, and their practicality. The behavioural side of decision making and the resulting limitations will be highlighted. Options pricing will be particularly considered as a tool, and the conclusions section will also develop some ideas on the construction of contracts and option agreements.¹²

The dissertation aims also at drawing together ideas from capital investment appraisal, decision analysis, and game theory to provide a theoretical framework for in-licensing.

⁹ Brealey and Myers (1996)

¹⁰ Hirshleifer and Reilly (1992)

¹¹ March (1994)

¹² Brandenburger and Nalebuff (1996)

4 Concepts and methods

4.1 Concepts

4.1.1 Limited rational choice

In-licensing is here defined under the constraints of the theory of limited rational choice. It means that decision makers develop ways to react to cognitive constraints that are no longer purely rational. For instance, they may use experience to supplement for missing information or avoid cognitive dissonance by suppressing discrepant information. It is assumed that decision makers see themselves as responsible, rationally acting persons.¹³ No investigation into their ways of coping with cognitive constraints or into their „hidden agendas“ will be attempted.

4.1.2 Investment under uncertainty

In-licensing decisions have three points in common: they are usually irreversible, they can, in theory, be deferred, and they carry more or less uncertainty of outcome.

For decisions, the calculation of commercial value, along with measures of uncertainty, is now frequently discussed but not always found relevant in practical decision making in the pharmaceutical industry.¹⁴ On the other hand, cost of development can be estimated, as well as marketing cost (which is more difficult). Different techniques are available to „monetarise“ the value of a decision.¹⁵

The following techniques have been described in a recent review:¹⁶

- Pay-back period
- Adjusted present value
- Simple option pricing
- Equity cash flow

¹³ March (1996)

¹⁴ Roberts (1994)

¹⁵ Clemen (1996)

¹⁶ Luehrman (1997)

For decisions under uncertainty, the use of options pricing techniques has been advocated.¹⁷

4.1.3 Follow-up of decisions

Decisions on whether to in-license a compound can be followed up provided there is a defined outcome. For drugs, these are either further development (or stop of such), approval by a health authority, marketing, and sales. Also, the cost for development and marketing incurred by any other party after a negative in-licensing decision by BI can roughly be estimated. Other concepts such as post-decisional surprise or regret will partly be covered, however, an extensive database for this does not exist and decision maker memory is not reliable enough.

4.1.4 Individual vs. group criteria for decision

Committee members, like members of continuous groups are believed to develop a common set of values and criteria.¹⁸ The deviation in this pattern can be interpreted by group dynamics but also preferences and „prejudice“ that comes from different training, risk tolerance, and business function. As the minutes of those BAC or ISC meetings rarely ever reflect dissenting opinions, the certainty of having made the „correct“ decision and the preference of rather having delayed certain decisions is an important individual decision parameter.¹⁹

4.1.5 Opportunity cost

On theoretical grounds projects would have to be compared to each other and such cost would have to be calculated. In practice, however, this is often not possible due to a multitude of projects going in parallel and almost constant inflow of new information.²⁰ Therefore, this concept will not be used.

¹⁷ Faulkner (1996)

¹⁸ Hirshleifer and Reilly (1992), pp. 213-216

¹⁹ Keeney and Raiffa (1990)

²⁰ Baldwin (1991)

4.2 Methods

4.2.1 Data collection

BI data on past in-licensing opportunities

BI has, more so in recent years, collected and standardised the data leading to decisions. They are contained in different documents such as

minutes of the BAC or ISC

overviews to ISC of licensing department

personal files and notes of licensing project leaders

Only in the past two years, formal documents (as mentioned in the DMQ) have been in use. No uniform document has been available throughout. It turned out that the evaluations were not collected at a central place, but often had to be reconstructed asking the relevant persons. In many cases, only hand-written notes were available. In many cases, only personal interviews with present or previous members of the licensing department could determine the reason why a project was abandoned by BI.

Compounds can only be compared when they are evaluated according to the same set of parameters. The Project Licensing Document (PLD; see appendix A) has been collected on all such drugs. For some substances only very limited data are available.

To see the outcomes, publicly available magazines and databases like Pharmaprojects, SCRIP, RD Focus, and IMS were searched. Pharmaprojects is a database that allows to look into the fate of a compound. It allows to judge where the development is and what can be expected in the near future. Not infrequently, however, the database keeps drugs as „under development“ whereas development has been stopped already. Therefore, in all cases, independent information via SCRIP or RD Focus was sought. Of marketed products, sales can be obtained via the IMS, the Institute of Medical Statistics. They are usually correct within 10%.

In-licensing decision maker questionnaire

At BI, in-licensing for global or major regional products is a task of the Business Development Division at Boehringer Ingelheim GmbH (Headquarters). They propose in-licensing

opportunities to the Business Area Conference (BAC) which consists of the Heads of the Divisions within Pharma and the Regional Responsibles for Europe, America, and AAA (Asia, Australia, Africa), and is chaired by the Head of Corporate Pharma. Decisions by the BAC are taken up again at the International Steering Committee (ISC) if internal resources for development are needed (which has been the case for all offerings covered in this project). The ISC which consists of the Heads of the Pharma Divisions and the Marketing Directors of Germany, the USA, and Japan, may overturn or modify a decision of the BAC. As it is also chaired by the Head of Corporate Pharma this usually does not happen. For details on the organisational structure at BI see appendix C; for a listing of committee membership, see appendix D.

Therefore, the members of these two committees (which greatly overlap) were sought for answering a questionnaire. This method was chosen over direct interviews as it avoids vague statements and allows the participant to take time to answer the questions. The choice of questions was guided by learning more about the decision behaviour of the individual. Compromises had to be made as full anonymity was not possible, so direct questions as to the degree of personal preparation for decisions were left out. As the meeting minutes do not contain dissenting opinions, the basis for decision making as well as judgement on the quality of decision preparation were most important to know. Therefore, the questionnaire concentrated on

- the criteria for taking or leaving an opportunity
- the individual „certainty“ of having taken correct decisions, and at the right time
- the satisfaction with the preparation of the decision (by area of expert opinion)
- the reliance on quantitative tools
- the opinion on the in-licensing process at BI

The questionnaires were analysed by what decision makers have in common, and where discrepancies were seen.

4.2.2 Techniques for analysis

I. Pharmaceutical Licensing Document (PLD)

The PLD was (as the fields on the time intervals, evaluation tools and primary contact at BI could frequently not be filled out) analysed for the following parameters only:

- substance
- indication
- type of data available
- offering company
- decisive reasons
- evaluation tools
- outcome

In a 2x2 table, the decisions and the outcomes were analysed and decisions categorised as correct positive, false-positive, correct negative, and false-negative. Rejected opportunities were categorised by the main reason for rejection.

Opportunities, grouped by stage of clinical development, were analysed for acceptance or rejection.

The appreciation of the use of quantitative tools was investigated.

II. Decision Maker Questionnaire (DMQ)

The number of returned questionnaires is given, with or without reasons for not returning or not completing.

The reasons leading to positive or negative decisions will be summarised into appropriate categories or headings and the main five categories given weights of 5, 4, 3, 2, and 1 according to the rank in the individual listing. Points will be added to give a composite score for the two separate sets of criteria; if criteria are essentially similar but use different wording, they will be grouped and the scores added to that group. An extra analysis will be undertaken for those who are members of the BAC or ISC only, and for members of both committees.

The percentage of inadequately prepared decisions, i.e. decisions that should have been delayed, will be given.

Mean scores and deviations will be given for the ratings of the four different assessments from R&D, medicine, marketing, and commercial.

The use of quantitative tools will be classified as follows:

- ignorance
- does not see relevance (relative to other means of judgement)
- sees relevance
- prefers more such tools

Regarding in-licensing activity, the type of responses will be classified and described as such:

- current status sufficient
- current status to be improved quantitatively
- current status to be improved qualitatively
- current status needs qualitative and quantitative improvement

Individual responses will be cited where appropriate.

5 Results

There were different opinions as to the usefulness of this study at BI: one area of concern was the going back of the PLD to 1990 where in-licensing was far from optimal. Another was concern about privacy regarding the highly sensitive information asked for in the decision maker questionnaire.

5.1 Results of the PLD

The PLD had, originally asked for more information than is presented here. However, it turned out that almost all data regarding the time course of an offer and the process of its evaluation, were rarely available. They are therefore not presented here.

5.1.1 Decisions and outcomes

During the period surveyed, there were 34 decisions made and minuted at BAC or ISC meetings on offers for compounds in phases I-III with more than local relevance and for which documentation was available. In 12 cases only phase I data were available, in 5 cases early, mostly uncontrolled phase IIa data were available while in the rest controlled clinical trials of smaller or larger size were done.

In 24 of these cases, the fate of the compound was identified and could be defined as „success“ or „failure“. In the remaining cases there was either no such outcome, or no further entries were found in Pharmaprojects suggesting that no activities were going on any more.

In table 1, „successes“ are defined as compounds which at least had to be pre-registration, „failures“ were compounds the development of which was stopped and this was documented.

	<i>SUCCESS</i>	<i>FAILURE</i>	<i>TOTAL</i>
BI ACCEPTANCE	6	1	7
BI REJECTION	13	4	17

Table 1: 2x2 table of BI decision performance in in-licensing

The table shows that BI is good at avoiding compounds that fail in development, however, it does also reject projects that, at least in development, live up to their expectations. Thus the table reflects a company that creates high hurdles for in-licensing products. It must be noted, though, that these compounds present a selection. It became apparent at the interviews with members of the Business Development Division that many opportunities are rejected before they reach the level of BAC or ISC.

5.1.2 Reject ratings and reject reasons

In table 2, the data describing the reasons for BI rejecting an opportunity are given. For marketing and commercial the category „correct“ was given only when the product turned out not to be a major success in the marketplace. The data must be taken with some caution. Frequently, when a project is rejected for toxicological reasons, no further evaluation, for instance by medicine or marketing, is conducted. Similarly, when a compound is rejected for medical reasons, no commercial assessment is usually attempted. Therefore, a hierarchical decision making process seems to be followed implicitly, with most rejections at the level of medicine. In many cases, some opinions were never given as a low (<<10%) likelihood of success did lead to rejection by itself. The results become interesting when the correct and incorrect rejections with regard to the fate of those opportunities are taken into account.

<i>Main rejection reason</i>	<i>correct</i>	<i>incorrect</i>	<i>total</i>
R&D	1		1
Medical	4	4	8
Marketing	1	5	6
Commercial		1	1
Not specified	2	2	4
Total	8	12	20

Table 2: Origin of main rejection reason by discipline.

It can be seen that the medical opinion was most frequently obtained, and that it was well balanced and more frequently correct than expected by chance. Overall, in many cases, formal opinions were not available, but had to be extracted from the BAC and ISC minutes. In many cases, the reasons were not given explicitly or were not documented.

5.1.3 Acceptance depending on stage of development

There was little correlation between the stage of development and the likelihood of rejection as seen in the following table. This suggests that the company was not in general against in-licensing early projects with an inherently increased risk. In the earlier stages, rejections were based on the medical opinion in most of the cases, in later stages commercial aspects were dominant.

<i>Stage of clinical development</i>	<i>rejected/ offered</i>	<i>% rejection</i>
I	6/8	75
IIa	3/5	60
IIb	14/16	84
III (pivotal)	3/5	60

Table 3. Rejections by stage of development

Opportunities that were judged positive but did not develop into agreements because the licensor insisted on a commercially unacceptable offer, are not mentioned here.

5.1.4 Use of quantitative tools

Quantitative tools such as pay-back periods, net present value or other systematic approaches were used but their impact on the decision rarely documented. A mentioning was given in at least one project-specific document for about 30% of all cases. In some cases, the cost of preclinical or clinical development were mentioned. For compounds accepted for in-licensing, the following data were consistently available: pay-back period, contribution margin III (Deckungsbeitrag III), discounted cash flow (DCF), and net present value (NPV).

5.2 Questionnaire

5.2.1 Return rate and completeness of questionnaires

Of 16 questionnaires sent out to members of BAC and ISC, 15 were returned, The Head of SBU Self-Medication did not return the questionnaire as he was not involved in in-licensing processes outside his over-the-counter medicines Division.

In some questionnaires, not all questions were answered. In particular, only two or three decision criteria were given in some cases.

5.2.2 Individual certainty of decision making

Most members of these committees rated their percentage of correct in-licensing decisions as very high, around 80-100%. Only one member went as far down as 50%. One person did not give an answer.

<i>Correct decisions in % of decisions</i>	<i>Number of questionnaires</i>
90-100	3
80-89	3
70-79	6
<70	2

Table 4. Individual certainty in decisions.

Given the results of the PLD, these figures appear rather high. A critical appraisal of one's own decisions may be difficult for decision makers, or they may indeed have improved compared to the 1990-1995 period. It is more likely, though, that in-licensing occurs too infrequently to provide frequent and sufficient feedback to decision makers at a later stage.

5.2.3 Criteria for positive decisions

The questionnaire set out deliberately to ask for criteria for accepting or rejecting separately. Normally one would assume that the two are just two sides of one coin, however, the obvious difference in most questionnaires reflects additional decision making strategies. According to the rating, the following list was constructed (sum of ratings for all respondents; any parameter listed as no. 6 or lower was not given a point.) If criteria were related by content, they were grouped under one single heading.

<i>Ratings (group)</i>	<i>BAC</i>	<i>ISC</i>	<i>BAC/ ISC</i>	<i>Total</i>
strategic fit	16	15	27	58
NPV/cost of goods/financial/profitability	14	8	15	37
likelihood of success	3	8	19	30
time to market/earlier than own	4	6	10	20
sales volume	13	2		15
good clinical data/stage of development	2	8	4	14

Table 5. Sum of ratings for positive decisions.

Strategy and profitability were top on the agenda for taking on a project. This high rank for strategy surprises as it is very broadly defined at BI. Ratings not mentioned in table 5 were thoroughness of evaluation, internal resources, preclinical rationale, improvement of business, technology in house, take option, no own product, global availability. Most of them never were mentioned among the top five in anybody's list.

Those who are only members of the BAC seem to place a high emphasis on sales volume which may be an expression of the need to obtain large market shares.

The ranking probably also reflects the type of uncertainties brought forward by the very projects that had to be decided upon.

5.2.4 Criteria for negative decisions

Those criteria are displayed in the same way. In the questionnaires, these were given as frequent as for positive decisions.

Ratings (group)	BAC	ISC	BAC/ISC	Total
economic less/cost of goods/sales/cost	30	10	17	57
validity of data/efficacy/safety/preclin. rationale,	2		29	31
likelihood of success/feasibility of approach	4	11	12	27
contribution to medical field/competitive advantage	5	9	9	23
strategic fit	8	12	2	22
compete with own products		5	14	19

Table 6. Sum of ratings for negative decisions.

There is a different pattern compared to the criteria applied for positive decisions. Economic arguments dominate rejections, but also competition with in-house projects appears as important. This stresses the relevance of the commercial assessment, but as with the criteria for positive decisions, the technical issues (likelihood of success, quality of technical data) follow next. Strategic fit is not an argument which, conversely, could mean that the absence of this criterion will not exclude an opportunity. Criteria like quality of evaluation, patents, limited scope/territory, technology in-house or early stage product were rarely mentioned.

5.2.5 Decisions perceived as not adequately prepared

13 of 15 respondents answered this question.

<i>Percent decisions better postponed</i>	<i>Number of respondents</i>
0	1
1-19	2
20-40	7
>40	3

Table 7. Post-decisional regret.

The results show that decisions may have been made in up to 30% where clearly the preparation of the decision was perceived as deficient. These results on post-decisional regret are inversely related to decision certainty. The respondents giving high values in this question often scored low on their own decision certainty.

5.2.6 Ratings of decision preparation papers

The decision papers had to be rated retrospectively and as an overall impression. This does not allow objective judgement, but the „gut feeling“ is asked for. The data are given as means and standard deviations, and as a percentage of ratings of 1 or 2 („very good“, „good“) received. They are given for the total group of respondents to this question (n=13).

<i>Expert opinion</i>	<i>Rating mean</i>	<i>Rating variation</i>	<i>% of grades „very good“ or „good“</i>
R&D	2,46	1,05	62
Medicine	2,38	0,87	54
Marketing	3,00	0,82	23
Commercial	2,62	0,77	54

Table 8. Rating of expert opinions by committee members

The ratings may reflect a partially good status of the quality of decision preparation. Medicine and R&D fare quite well although with a large spread (standard deviation). The rating for the marketing opinion is comparably poor, especially taking into account that the commercial decision is much based on the marketing assessment.

5.2.7 Use of quantitative tools

In general, the use of quantitative tools seems to be encouraged, but members have little experience actually using them taking from the scarce comments received.

<i>Comment</i>	<i>Number of respondents</i>
ignorance	1
do not see relevance	2
see relevance	10
prefer more of such tools	2

Table 9. Relevance of quantitative tools

The answers were usually positive. No special suggestions on specific instruments were given, but they had not been requested. Among the techniques, NPV was mentioned several times. Still, three members do not know or see the relevance of such tools. All in all, the results are what should have been expected from members of top management committees.

5.2.8 Opinion on in-licensing activity

The opinions on in-licensing activity showed little consensus as to the performance.

Comment	Number of respondents
current status sufficient	3
needs more quantity	3
needs more quality	3
needs both more quality and more quantity	5

Table 10. Satisfaction with in-licensing function

Overall, most respondents saw room for improvement qualitatively and/or quantitatively. Taking results from responses further above, this may have to do with decision preparation.

6 Conclusions

6.1 Documentation of decisions during 1990-1995

The documentation of decisions is rather incomplete for these years. The minutes of the BAC and ISC do not always allow to find the main reason for rejection or acceptance, and in most cases the assessment documents were not retrievable. The quality of these documents ranges between a note of less than one page and a detailed and well-referenced document. One must note that many projects were rejected before reaching the level of the BAC or ISC, and for them virtually no documentation is available. The same is true for projects that were accepted but where the potential licensor insisted on an unacceptable deal.

There are no standards or checklists for these assessment documents nor for the process and responsibilities.

It appears that the software used for commercial assessment is not described in a standard operating procedure, and that standard assumptions are not given explicitly. For instance, marketing data often assume high marketing expenses (up to 50% of gross price) thus decreasing the commercial value of an offer.

6.2 Accepted vs. rejected opportunities

BI tended to reject many projects. On the other hand, projects accepted by BI had a good chance of being completed and reaching the market. It is noteworthy that medicine was right in half of the cases which is much higher than expected given the paucity of data available.

The value of rejected opportunities is difficult to estimate. Roughly, sales between 50 and 100 million DM/year would be expected per product. Given that in 5 years at least 10 projects were rejected that could have contributed to sales, this amounts to 500 - 1,000 million DM/ year for the lifetime of these products.

This policy reflects prudence rather than gambling, but may also reflect a lack of calculated risk taking, e.g. by making options agreements (this has been done more frequently in 1996/1997).

6.3 *Criteria for decision*

BI decision makers are very sure of their decision quality especially if one considers the known likelihood of taking a wrong decision. It is not clear whether this is a justification process or simply is because of insufficient feedback regarding decisions made in the past.

The decision criteria are rather homogeneous although they purportedly did not communicate to each other about the questionnaire. There were some remarkable findings:

- a) BAC members had a preference for business criteria while likelihood of success or validity of data played a higher role for members of both committees (of whom 6 are medically trained).
- b) While positive decisions were much determined by strategic fit, financial, marketing and scientific aspects, negative decisions were mostly driven by business (economics) and/or scientific and medical validity and likelihood of success.

This discrepancy could be explained by the fact that there exists a hierarchy of criteria. A positive decision may only be reached once the likelihood of success and commercial criteria are fulfilled, and in such cases the next criterion will be „strategic fit“. When, on the other hand, a project is rejected, it does not even reach the level where the „strategic fit“ question is posed.

6.4 *Quality of decision preparation*

Decision makers had major problems with the quality of decision preparation. In particular, marketing assessments were seen with scepticism.

The mean percentage of 30% of decisions that should rather have been postponed surprises as this is not reflected in the minutes of those meetings. This contrasts with the decision certainty mentioned above, and it could be interpreted as a potential lack of open communication during such meetings. Also it appears that appeals to better decision preparation have not been followed and that poor assessment papers are still tolerated, even if just by inaction.

6.5 Reliance on quantitative tools

The assessments usually contained figures such as cost or time of development, estimated market share or likely price acceptable to the market. When it came to likelihood of success, rarely did R&D or Medicine give a probability figure, or a series of probabilities (in the case of a stepwise approach). Such would, however, be needed for more sophisticated decision analysis.

Tools for capital investment appraisal were in general found relevant. The most frequent comments were on net present value and pay-back period. Options pricing was never mentioned. While net present value was mentioned, almost none of the decision makers stated its relative impact when accepting or rejecting the proposal. The same was true for the pay-back period.

Sensitivity analysis was partly employed giving a pessimistic, realistic, and optimistic version of sales expectations. More frequently, scenarios were used.

7 Recommendations

7.1 Decision preparation

7.1.1 Identify opportunities proactively

Business opportunities must be collected at one entry point, in the Business Development division. The competing values of quality and speed must be internalised and considered. Confrontation with lost opportunities must be sought and not avoided. Minimal commercial criteria should be developed, for instance, for indications or therapeutic areas.

7.1.2 Plan the evaluation carefully

Before going into action, the crucial questions and their internal dependency must be asked by the business opportunity team (BOT). The team will then decide whether all functional assessments need to be started immediately or whether a critical outcome of one may already mean a no-go decision.

While checklists are sometimes accused of killing creativity, they must be used in order not to overlook important issues. Examples for such checklists have been developed by the author and can be found in appendices E and F, respectively. The teams must be asked to develop such and other checklists which should then be sanctioned by the functional area heads or the BAC.

7.1.3 Improve licensing documentation

The company should document its licensing activities in a standard way, possibly with an extended version of the PLD. This file should be electronically retrievable and be updated continuously. It is not recommended to go far back as it appears that before 1993 little coherent documentation was available.

In addition, a licensing logbook should be kept on all business opportunities. This should describe the responsible contact, then, chronologically, the activities undertaken and plans for

the future activities in that project. Thus it will be possible to follow the time spent on projects as in some cases not mentioned here opportunities have been lost due to slowness on the side of BI. This logbook would become part of the in-licensing audit.

7.1.4 Define the place of assessment papers and of quantitative assessment

Assessment papers should be prepared with utmost sense of responsibility. They should be referenced, and be signed by the author and a second person who should act as the „devil's advocate“ during the writing process be appointed by the Head of that Division.

In particular, the description of assumptions and the elaboration of alternatives must be checked. When risks are given it should both be specified how high the risk or probability is (in fractions of 1), what would contribute to decreasing this risk, and how much time and cost such efforts would require. On this basis, decision trees could be constructed.

Regarding quantitative parameters, these should be used in all assessments. For medical, the cost and timelines of development should be calculated on the base of BI internal full cost data and realistic patient enrolment goals. For non-clinical development the toxicological and production risks must be given and where possible quantified, and the cost until registration given. For commercial evaluations, the methods used should be standardised and decisions made on the choice of such, i.e. NPV, weighted-average cost of capital (WACC), or options pricing methods.

7.1.5 Set the structure and content of decision papers

The structure and content should be aimed at leading to a decision. Therefore, different alternatives for action must be described, their pros and cons be shown. Also, the cost of a non-decision at the particular stage must be described and quantified.

The executive summary should be written by the responsible member of the Division Corporate Business Development.

7.1.6 Make in-licensing an integral part of the pharma strategy

The pharma strategy should point to the gaps in the therapeutic areas. This helps focusing efforts.

Criteria should be specified regarding the commercial value and minimum requirements, e.g. by pay-back period, or net present value. Therefore, a quick commercial value check should stand at the early evaluation stage and guide, in a conservative way, the further negotiations with the potential licensor.

7.1.7 Create business opportunity teams

The licensing advisory teams should be complemented by business opportunity teams (BOTs) that have full responsibility for negotiations and are charged with providing decision preparation as well as negotiating the contract to a pre-final stage. There must be a training program for members of such groups. Training must be given by external seminars in decision analysis, and negotiating strategy and tactics. A written negotiation plan must be prepared by the team and proposed to the BAC.

The classical project teams should only be instituted once the contract has been signed, but project management tools should be used professionally by the BOTs.

7.1.8 Involve the legal department early

The Legal Department should be involved as soon as the BAC has generally given a go-ahead and specified the boundaries for negotiation. In principle, the potential licensor should be offered a draft contract from BI.

7.2 Decision making

7.2.1 Minute decisions

Decisions need not be made with unanimity. Dissenting votes and their reasons should be minuted. For a given proposal/project, the project log should contain all relevant decisions; it could be structured according to the PLD and should be electronically retrievable (see 7.1.3). The minutes should contain the framework for further negotiations where desired, and specify the goal (contract proposal, option agreement to a certain goal) the BAC wishes to have.

7.2.2 Inform BAC on rejected business opportunities

When rejections are made on compound or product offers, the BAC should be informed of this issue before finalising it. This allows a potential intervention to reverse a negative recommendation, for instance for strategic reasons.

7.2.3 Concentrate decision making in the BAC

From the similar criteria applied and the overlap in members, it appears sufficient to have the in-licensing decision made at the BAC. The ISC should only be involved if, for example, via a project team, substantial development work will be done by BI. Such involvement can safely be done after the signing of the contract. A mechanism must be found for how the marketing opinion (bottom-up) will be better represented at the BAC level, possibly by assignment of such tasks to the three main area managers.

7.3 Learning

7.3.1 Give feedback on correctness of decisions

Business development should give a regular update on rejected proposals and their development. The „score card“ should be presented to decision makers. Also, the authors of the functional decision papers should be given feedback once another company has taken on a project rejected by them and they should be asked to keep track.

7.3.2 Establish an in-licensing audit

If one describes „in-licensing efficiency“ as maximising the number of in-licensed compounds with high net present value and, at the same time, reducing the risks of accepting non-viable compounds, the questions how to assure this quality of decision preparation. Therefore I suggest to review the quality and timeliness of decision preparation and execution once a year. Such an audit could be conducted by an internal or an external group. This group would use the PLDs and the follow-up data to decisions, the decision maker questionnaire, determine the net present value and risk structure of in-licensed compounds, and give a quantitative view on lost opportunities.

8 List of appendices

- A) Pharmaceutical Licensing Document, PLD(sample)
- B) Decision Maker Questionnaire, DMQ, for members of BAC, ISC (sample)
- C) Organisational Chart, Boehringer Ingelheim
- D) List of BAC, ISC members
- E) Draft In-licensing Checklist/Business Development
- F) Draft In-licensing Checklist/Medicine

Appendix**A) Pharmaceutical Licensing Document, PLD(sample)**

Substance
Indication
Type of data available
phase I
phase II, not controlled
phase II, controlled
Offering company
Sales of offering company (<10 mio, 10-100 mio; >100 mio, <500 mio, 500 mio - <2,000 mio; > 2,000 mio)
primary contact at BI
time of first contact
time to internal evaluation complete
time to BI decision
decision maker
time to contract (if applicable)
If rejected, opinions (1=excellent; 6=absolutely insufficient)
medicine
R&D
marketing
commercial
decisive reasons (specify)
evaluations tools for commercial assessment (e.g. NPV)
outcome
approved
when

not filed
development stopped
unknown
still under development (likelihood of success <u>now</u> ?)

Appendix**B) Decision Maker Questionnaire, DMQ, for members of BAC, ISC (sample)**

As someone deciding on in-licensing projects or contributing to such decisions, you may have a special opinion on how this decision went, or, how it could have prepared for the better.

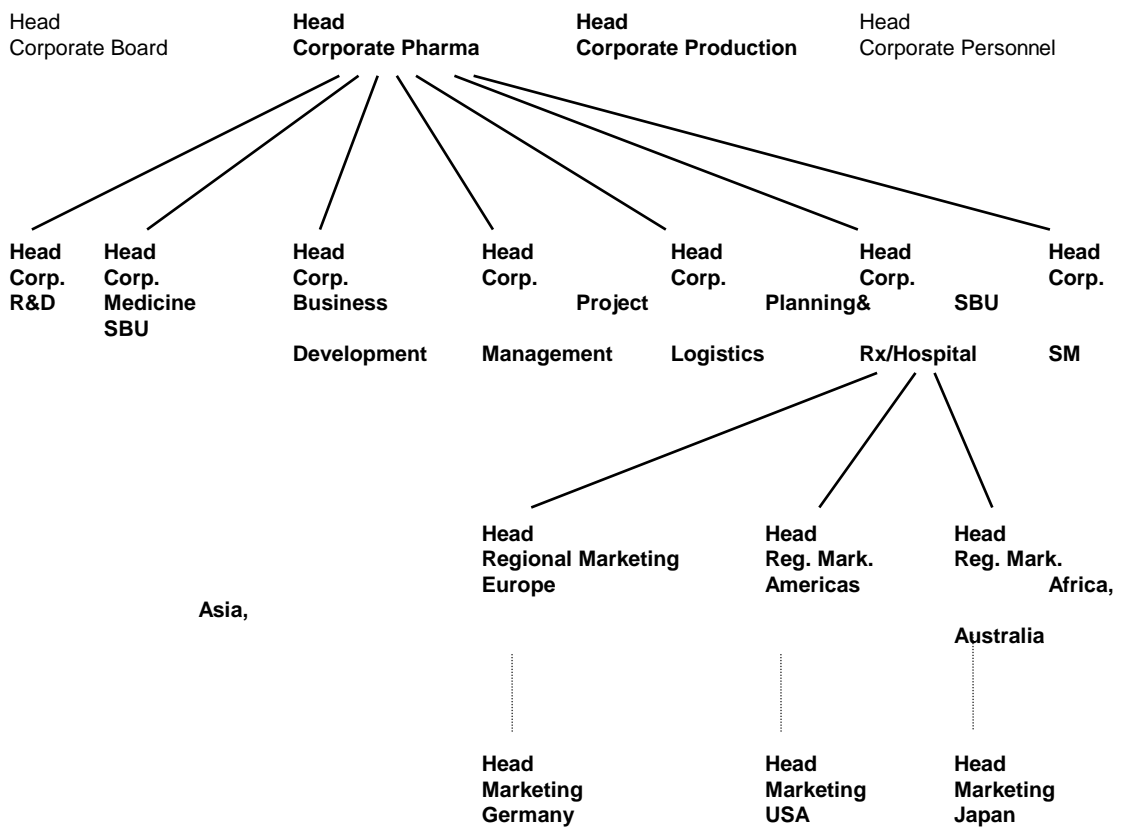
In order to become ever better in making decisions you could help us in answering the questions below.

1. Which of the two committees are you a member of (BAC; ISC) ?
2. How often have you, as such a member been part of such decisions in the past 12 months?
3. How sure have you been, on average that you made the right decision (0 to 100%) ?
4. If you made a positive recommendation or decision, what features were most frequently important, such as high likelihood of success, strategic fit, or others (please name at least five on descending order of priority) ?
5. If you made a negative recommendation or decision, what features were most often relevant or decisive for you (also name five in descending order) ?
6. In what percentage the decision had not been adequately been prepared for and should have been postponed (give %) ?
7. If you were to give marks (1=very good; 6=miserable) on average, how would you rate the
marketing assessment
R&D assessment
medical assessment
commercial assessment
for the proposals in the past 12 months ?
8. How much do you rely on quantitative measures such as NPV ?
9. Do you think BI does adequate in-licensing (yes; rather more; rather less)

Appendix

C) Organisational Chart, Boehringer Ingelheim

Organisational Chart, Boehringer Ingelheim
(Committee members in bold letters)



..... functional reporting line; direct reporting line goes to local managing director

Appendix**D) List of BAC, ISC members**

Function	BAC	ISC
Head of Corporate Pharma (Board)	+	+
Head of Corporate Division Medicine	+	+
Head of Corporate Division R&D	+	+
Head of Corporate Technics/Production (Board)		+
Head of Corporate Division Business Development	+	+
Head of Corporate Department Project Management	+	+
Head of Corporate Division Pharma Planning	+	
Head of Corporate Division Self Medication	+	
Head of Corporate Division Rx/Hospital	+	+
Marketing Director USA		+
Marketing Director Germany		+
Marketing Director Japan		+
Head Regional Marketing Europe	+	
Head Regional Marketing Americas	+	
Head Regional Marketing Australia/Asia (AAA)	+	

Appendix**E) Draft In-licensing Checklist/Business Development**

#	Main Questions	done	Remarks
1.	Strategy		
1.1	Is the project in line with the pharma strategy?		
1.2	How does the project fit into the R&D strategy?		
1.3	When could the product reach the main markets?		
1.4	Is the product a potential breakthrough – and why?		
2.	Availability of information		
2.1	What data can be seen under confidentiality agreement?		
2.2	Will important data become available during the negotiation process- and which ones?		
2.3	Does the documentation give an orderly impression?		
2.4	What negative data are available on the project? Has it been rejected by other parties?		
2.5	Which additional information is seen necessary to give a sound recommendation?		
3.	Evaluation		
3.1	R&D assessment: when and by whom?		
3.2	Medical assessment: when and by whom?		
3.3	Marketing assessment: when, which scenarios, and by whom?		
3.4	Commercial assessment: which method, when, and by whom?		
3.5	Who will do the due diligence (names)?		
4.	Negotiation		
4.1	Is a BI negotiation strategy determined?		
4.2	Which negotiation weaknesses has the partner?		
4.3	What are the time constraints?		
4.4	What is the BI preferred deal structure?		
4.5	What is the worst case loss?		
5.	BI internal commitment		
5.1	Is there a positive opinion from committees (BAC, IMC)?		
5.2	What critical issues are known from relevant Division Heads?		
5.3	What critical commitment is still outstanding?		
6.	Partner		
6.1	How trustworthy is the partner?		
6.2	How (financially and other) stable is the partner?		
6.3	What kind of BI support for drug development is needed/desired?		
7.	Contract		
7.1	What kind of contract is envisaged and when?		
7.2	How will BI control the contents of the contract?		
7.3	How is decision making foreseen in the contract?		
7.4	What happens if partner gets in trouble/bankruptcy/other events?		
7.5	Under which conditions can BI cancel the contract?		

Appendix**F) Draft In-licensing Checklist /Medicine**

#	Main Questions	done	Remarks
1.	Rationale		
1.1	What preclinical data support it/speak against it?		
1.2	What clinical/pathophysiology data support it/speak against it?		
1.3	What clinical trial data are available and do they support the hypothesis?		
2.	Efficacy		
2.1	Which efficacy data are available?		
2.2	Do they support a claim? Are they a biological signal?		
2.3	Are there data which speak against efficacy?		
2.4	Are the data exploratory/confirmatory?		
2.5	What is the likely advantage over existing treatments? Has it been shown?		
2.6	Is there a dose-response-relationship?		
3.	Therapeutic Need		
3.1	Patient population (potential)		
3.2	Treatment gap, e.g. %responders, incomplete response		
3.3	Could there be a pharmaco-economic basis?		
4.	Safety		
4.1	What safety problems are expected from the preclinical data?		
4.2	What is the safety pattern from the clinical data so far?		
4.3	Which advantage has this pattern over available treatment?		
4.4	Is there a chance to optimise the dose?		
5.	Convenience		
5.1	Are there problems with administration or handling?		
6.	Competitive position by the time of launch?		
6.1	What are the likely competitors by the time of launch?		
6.2	Which early developments must be observed?		
6.3	What is the likely gold standard by the time of launch?		
6.4	Why would prescribers choice our drug over those, and when?		
7.	Risks		
7.1	What are the main development risks?		
7.2	Are there problems with the material supplied by potential licensor?		
7.3	Is there competition with BI own development compounds?		
8.	BI resources needed		
8.1	What is the cost of non-clinical development from now on?		
8.2	What is the cost of clinical development from now on?		
8.3	What is the minimum of BI medicine personnel needed (FTE years)?		
8.4	If BI would do the entire clinical development, what resources would be needed?		

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