APPRAISING, ASSESSING, AND MANAGING RISK IN FUNDING TECHNOLOGY TRANSFER PROJECTS

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CHAPTER 1. INTRODUCTION

Technology transfer projects, in general, require substantial funds. It is therefore customary for most small and medium enterprises, which suffer a paucity of financial resources from the market to approach financial institutions/banks for funding such expensive projects.

In the modern world of rapid technological change, buyers of new technologies as well as their financiers need to be prepared for the risk of technological failure. Erroneous decisions in respect of the acquisition of new technology transfer projects have led to endangering the survival of industries. Whereas such oversight has the potential to reduce even well-run large-sized enterprises to liquidation/bankruptcy, in contrast, correct and sound decisions on technology transfer projects can be instrumental in changing the fortunes of even weak and marginal firms. Therefore, it is essential for both buyers of new technologies and their funding institutions to apply a sound conceptual framework in appraising all new projects so as to minimize their risk in opting to support unsuccessful technology transfer projects.

The **objectives** of this study are twofold:

(i) Evaluate and summarize a conceptual framework and the procedures applied by funding institutions, including those in India, to manage risk in financing technology transfer projects.

(ii) With this evaluation as a basis, develop an integrated appraisal framework with the focus on crucial financial aspects and a scoring/rating scheme that is of practical use to financial institutions in assessing and managing risks in funding technology transfer projects.

The study has been divided into four chapters, including this brief introduction as chapter 1. Chapter 2 focuses on a theoretically correct conceptual framework as well as the rigorous and comprehensive procedures of evaluation and financing adopted by funding institutions in India. Chapter 3 presents a framework for assessing and managing the risks in funding technology transfer projects. The concluding observations are noted in chapter 4.

CHAPTER 2. APPRAISING AND FINANCING TECHNOLGY TRANSFER PROJECTS: A CONCEPTUAL FRAMEWORK

A conceptual framework for term loans as a source of financing technology transfer projects, with the focus on India, is described in section 2.1. Section 2.2 discusses the project appraisal strategy used by funding institutions in India. Section 2.3 summarizes the main points covered in this chapter.

Section 2.1 TERM LOANS AS A SOURCE OF FINANCING PROJECTS

Term loans (with a maturity period of 6-10 years) are the most common form of finance for technology transfer projects opted for by financial institutions in India. The risks entailed in such funding can be minimized if the financing institutions ensure security; incorporate restrictive terms and conditions (known as covenants) in the term loan agreement; stipulate the requirement for comprehensive project documentation (along with a list of forms); ensure the disbursement and utilization of the loan; and introduce an appropriate legal charge as well as the registration of securities. These procedural aspects are discussed briefly in this section.

Security

All term loans are secured. Whereas the assets financed by term loans serve as primary security, all the other current and future assets of the company provide collateral/secondary security for the term loan. Generally, the borrower's current as well as future immovable properties constitute a general mortgage/first equitable mortgage/floating charge for the entire institutional loan, including commitment charges, interest, liquidated damages, etc.. They are further secured by hypothecation of all movable properties, subject to a prior charge in favour of financing institutions and banks in respect of the working capital finance/advance.

Covenants

To protect their interests, financial institutions reinforce the asset security stipulation with several restrictive terms and conditions, known as covenants. These covenants are positive/affirmative (what the borrower should do) or negative (what the borrower should not do) in the conduct of operations; and they fall broadly into four sets as per their relation to assets, liabilities, cash flow, and control.

Asset-Related Covenants: These are intended to ensure that borrowers maintain a minimum asset base. Included in this set of covenants are:

- maintenance of working capital positions in terms of a minimum current ratio;
- restriction on the creation of further charge on assets; and
- ban on the sale of fixed assets without the lender's concurrence/approval.

Liability-Related Covenants: These covenants may, *inter alia*, include:

- restraint on the incurrence of additional debt/repayment of the existing loan, say, without the lender's concurrence/prior approval;
- reduction in the debt-equity ratio by the issue of additional capital; and
- prohibition of the disposal of the promoter's shareholding.

Cash Flow-Related Covenants: These are intended to restrain the cash outflow of borrowers and may include:

- restrictions on new projects/expansion without the lender's prior approval;
- limitation on the dividend payment of a specified amount/rate, unless declaration of a higher amount/rate was previously sanctioned by the funding institution;
- arrangement for additional funds as unsecured loans/deposits to meet overrun/shortfall; and
- ceiling on managerial salary and perks.

Control-Related Covenants: These aim at ensuring competent management for the borrowers. This set of covenants may include:

- broadbasing of the Board of Directors and finalization of the management set-up in consultation with the financial institution;
- effective organizational changes and appointment of suitable professional staff; and
- appointment of nominee directors to represent the financial institutions and safeguard their interest.

In addition to the abovementioned covenants, certain other covenants that specify particular expectations from the borrowing firm during the loan term are also included in a loan agreement. They provide, *inter alia*, for:

(i) furnishing of periodical reports/financial statements to lenders;
(ii) maintenance of a minimum level of working capital;
(iii) creation of a fund for redemption of debt; and
(iv) maintenance of a certain net worth.

Repayment Schedule/Loan Amortization

Term loans have to be amortized according to a predetermined schedule. The payment/repayment has two components: (i) interest and (ii) repayment of principal.

The interest component of loan amortization is a legally enforceable, contractual obligation. Borrowers have to pay a commitment charge on the unutilized amount. The interest on term loans, which are subject to a

minimum prime lending/floor rate (PLR), is risk-related and varies with the borrower's credit risk. In case of default in respect of the interest and principal components, liquidated damage/penal interest is required to be paid at a specified rate for the period of default on the default amount.

Typically, the principal is repayable over a 6-10 year period after an initial grace period of 1-2 years. Whereas the mode of repayment of term loans is equal, semi-annual instalments in respect of institutional borrowings, term loans from banks are normally repayable in equal, quarterly instalments. With this type of loan amortization pattern, the total debt servicing burden declines over time, with the interest burden declining and the principal (instalment) remaining constant. In other words, the common practice in India to amortize loans is repayment of the principal in equal instalments (semi-annual/quarterly) and payment of interest on unpaid/outstanding loans.

List of Forms

The list of forms to be submitted along with the application for financial assistance includes:

1. Letter addressed to the bankers
2. Existing long-term borrowings
3. Existing short-term borrowings
4. Distribution of shareholdings
5. Particulars of imported machinery
6. Particulars of indigenous machinery
7. Raw materials requirements
8. Estimates of cost of project
9. Calculation of:
    (a) cost of project; and
    (b) margin money
10. Means of financing
11. Proposal for raising share capital
12. Sources of expenditure incurred
13. Estimates of cost of production
14. Estimates of working results
15. Estimates of production and sales
16. Calculation of wages and salaries
17. Unit cost of production
18. Cash flow statement
19. Projected balance sheet
20. Break-even point.

Documentation and Disbursement of Term Loans

After the funding institutions have approved the project, a formal financial letter of intent is issued in favour of the applicant. The letter of intent is issued to the applicant in the prescribed form, with the following enclosures:

- Special terms and conditions applicable to the financed fund
- General conditions applicable to the financed fund

- Specimen copy of the common loan agreement
- Draft of the resolution to be passed by the borrower's Board of Directors for accepting the letter of intent.

On receipt of the letter of intent, the applicant scrutinizes the papers and may seek any additional clarification from the lending institution, if necessary. If the terms of sanction are acceptable, the borrower is expected to take the following action:

- Convene a board meeting for acceptance of the letter of intent and passing the board resolution. The formal acceptance is to be conveyed to the lending institution within, say, 30 days (in India) from the date of the letter of intent.
- Finalize a definite drawal schedule depending upon the progress of project implementation. The drawal schedule is also to be intimated to the lending institution along with the acceptance.
- Obtain draft copies of other loan documents, such as the deed of hypothecation and/or letter of guarantees; an undertaking for the disposal of shareholding acquired for meeting any shortfall in the project cost; a declaration for the creation of joint mortgage by deposit of the title deed, etc, as required, as per the terms of sanction.
- Convene a Board meeting for approval of all the loan documents, and obtain the necessary sanction from the Board for the execution of documents.
- The disbursement of loan is further subject to compliance with pre-disbursement conditions, as stated in the general conditions applicable to financial assistance. All necessary undertakings and certificates from legal advisors and/or statutory auditors, wherever necessary, must be prepared and submitted to the lending institution.
- All loans are subject to the creation of a valid mortgage of all immovable properties in favour of the lending institutions. The creation of mortgage generally involves a lengthy procedure, and the lending institution may agree to release the loan against the promoter's personal guarantee, pending creation of a final charge over the security. The matter, in this regard, must be cleared, and a draft for personal guarantee be obtained from the lending institution.

Finally, all the documents are to be executed by authorized persons in the lending institution's legal department.

Disbursement and Utilization of Loan

The procedure for disbursement and utilization of loan is as follows:

- The lending institution gets all the documents executed.
- The lending institution disburses the loan in stages, depending upon the progress in project implementation and subject to compliance with pre-disbursement requisites and other special conditions.

The promoter has first to bring in a substantial part of his contribution (generally a minimum of 50%) before the financial institution disburses any part of the loan. An auditor's certificate may also be required for this purpose, certifying the promoter's paid-up capital at the time of disbursement.

A **progress report** on project implementation has to be submitted to the lending institution, giving the details of expenditure already incurred under various heads as also a funds/cash flow statement showing the phased requirement of funds for the project's timely execution. The lending institution proceeds to evaluate these reports and finalize a disbursement schedule, which is further subject to review from time to time on the basis of the progress in project implementation. Some of the safeguards are:

- All disbursements are made by cheques drawn in favour of the borrower, and the date of each cheque is taken as the date of disbursement of the particular loan.
- All the cheques are required to be deposited in a 'special bank account' to be maintained for this purpose. The funds lying in this account are not subject to the right of set-off or lien by the bank. For this purpose, a letter must be obtained from the bank forgoing its right of set-off or lien and deposited with the lending institution.
- The borrower must keep an accurate record of withdrawals from this special account and also authorize his/her bank to reveal to the lending institution all the information, as required, in respect of operations in this account. The borrower is also required to furnish a statement showing the manner in which the loan already disbursed has been utilized. The statement is to be submitted to the lending institution at the end of each month following the month in which the loan monies are disbursed.

The entire loan is not disbursed until the final security by way of mortgage of immovable property is created.

Charging of Securities

All loans by financial institutions are secured by:

- A first mortgage charge in favour of the lending institutions of all the borrower's immovable properties, both current and future; and
- A first hypothecation charge in favour of the lending institution of all the borrower's movables (except book debts), including movable machinery, machinery spares, tools and accessories, current and future, subject to prior charges created and/or to be created
  - (a) in favour of the borrower's bankers on the borrower's stocks of raw materials, semi-finished and finished goods, consumables stores, and such other movables as may be agreed by the lending institution for securing the borrowings for working capital requirements in the ordinary course of business; and
  - (b) on specific items of machinery purchased/to be purchased under deferred payment facilities to the borrower, as permitted by lending institutions.

The hypothecation agreement is invariably executed before any loan disbursement. The borrowers should, however, take immediate steps for the creation of mortgage, allowing access to the entire sanctioned loan. The creation of mortgage would involve the following steps:

- Scrutiny of title deeds of all immovable properties and mutation certificates by the lending institution's legal department to determine the borrower's ownership of and clear marketable title to these properties. Copies of all title deeds, mutation certificates, and other relevant documents should promptly be made available to the lending institution to enable it to verify these claims.
- Investigating the records of the local land authorities/Registrar's office is relevant to ensure that the property under investigation is free from all encumbrances. This exercise is also the responsibility of the lending institution's legal department.
- Obtaining the Board's authorization for the creation of mortgage and signing the declaration in the prescribed form. The Board's resolution in this regard should also authorize the person(s) entrusted with the responsibility of depositing the original title deeds with the lending institution to handle the creation of mortgage.
- Obtaining income-tax clearance as per the requirements of the Income Tax Act for the creation of mortgage. The income-tax clearance certificate is also to be submitted to the lending institution's legal department.
- Depositing all the title deeds, mutation certificates, etc with the lending institution's legal department, and furnishing the necessary declaration in the prescribed form, duly signed by authorized person(s).

With the completion of all the foregoing formalities, the mortgage charge is created. Nevertheless, the lending institution's legal department has to inform the borrower of the final creation of security and the date from which the mortgage is deemed to be created.

Registration of Charge

Particulars of all charges created in respect of the company's assets are required to be registered with the Registrar of Companies within 30 days of the creation of every charge (in India). The company should therefore arrange to file, within the stipulated time, particulars of the charges in the prescribed forms with the Registrar of Companies. Particulars of both the hypothecation charge in respect of movable properties as created by the Deed of Hypothecation, and the mortgage charge in respect of immovable properties, are required to be submitted and registered with the Registrar of Companies.

Section 2.2 APPRAISAL OF TECHNOLOGY TRANSFER PROJECTS

Financial institutions/banks carry out a thorough scrutiny of a project submitted to them for financing. The appraisal covers the following aspects of a proposal:

(i) technical feasibility;

(ii) managerial competence;

(iii) commercial and financial viability; and

(iv) environmental and economic viability.

Technical Feasibility

All the factors relating to infrastructural needs, technology, availability of machine, material, etc are scrutinized under this head. Broadly speaking, these factors include: availability of basic infrastructure; licensing/registration requirements; selection of technology/technical process; and availability of suitable machinery/raw material/skilled labour,

Basic Infrastructure

The main points to be examined under the head of basic infrastructure are as discussed below.

Land and its Location: Most technology projects require land. The area of the available land should not only meet the existing requirements but take care of future expansion plans as well. The location of the land is also vital inasmuch as it has to be accessible with the existing transport facilities. Projects located in well developed industrial areas are greatly facilitated by the readily available basic infrastructure.

Buildings: Necessary plans for factory buildings, plant room, workshops, administrative blocks, residential blocks, etc, as considered necessary, need to be finalized and provided for in the technology project cost.

Availability of Water and Power: Water and power are two other vital requirements. Some projects may consume large quantities of water, which may be available either through the municipal supply or from underground sources. Storage tanks of adequate capacity may also be required and should therefore be provided for in the project.

Many projects have recently suffered due to the erratic power supply in some countries of the Asia-Pacific region. Therefore, arrangements for sanction from the electricity boards for the required power load and for the provision of alternative captive power generation capacity are essential in all cases.

Availability of Labour: The availability of labour is dependent mainly on the project's location. Cheap and abundant supply of labour facilitates project implementation. For technology projects located in far-flung areas, special incentives might be necessary to induce the labour to shift to the workplace neighbourhood, thereby adding to the cost of the project and its implementation.

Licensing

Certain technology transfer projects may require prior government approval in terms of licensing. This requirement should be ascertained so that necessary arrangements are made in case industrial licences are a prerequisite.

Industries are discouraged from setting up new ventures in a few manufacturing sectors that have exceeded an adequate capacity in the country and are mentioned in the negative list. This list is amended from time to time, and industries thus 'blacklisted' are generally not extended any financial assistance by funding institutions. Special efforts would therefore be necessary and cogent reasons would have to be given to justify the setting up of such new technology projects.

Technology/Technical Process

An important aspect of project evaluation is the critical examination of the technology/technical process selected for the project. The main points considered in this regard are as under.

Availability: The technical process/technology selected for the project must be readily available either indigenously or with foreign collaboration. Foreign collaboration, if not covered via Reserve Bank of India (RBI), requires prior permission from the Government of India and is generally permitted in the following cases: (a) where indigenous technology being too closely held in India is not available; or (b) where foreign collaboration is necessary for updating the existing industry and modernization thereof; or (c) where the project is for import substitution or for setting up of an export-oriented unit.

Many foreign collaborations are now approved by RBI, rendering approval from the Government of India redundant. Full provisions in this regard must be elaborated in the project report. The technical process selected has to be briefly stated in the project report and critically compared with the other technical processes already in operation for the manufacture of similar products to establish its superiority over these existing processes.

Application: The selected technology must find successful application in the country's environment, and the management (promoter) should be capable of fully absorbing the technology. The importance of such application needs to be stressed as many projects have failed because the chosen technology could not be successfully implemented in the Indian environment.

Continuous Updating: The selected technology should not only be modern but, what is more, the underlying technical arrangement must provide for its constant updating as a necessary safeguard against the process becoming obsolete. The Research and Development (R&D) facilities required for the complete absorption and continuous updating of technology need to be studied in-depth to ensure good long-term prospects for

the technology transfer project.

Technical Personnel Training Facilities: The foreign technical collaboration should provide necessary training facilities to personnel responsible for project implementation and the subsequent running of the project. The availability of technically trained persons for the selected technical process, indigenous or foreign, is a priority in all cases.

Plant Size and Production Capacity: The selection of plant size and production capacity is dependent mainly on the promoter's total capital outlay and also on the available market for the product. This aspect is crucial in selecting the right technology, i.e. one that is suitable for the envisaged scale of production. The creation of capacity for overproduction has the disadvantage of causing a possible increase in the capital cost with a consequent interest load, which may ultimately mar the project's success. The project may fail solely on this account even when the best technology has been selected.

Availability of Machinery

After the technology is selected, the availability of plant and machinery for the project is to be ensured. Some plants may require a long lead time, which may result in delay and consequent cost overrun, unsettling the financial planning at the outset. It is also desirable for the suppliers to give a realistic guarantee for the plant's performance up to the rated capacity. Necessary arrangements for servicing of the machinery as also for the supply of spare parts and consumables need attention to prevent production bottlenecks caused by the failure of plant and machinery in the long run.

Availability of Raw Material and Consumables

The easy availability of raw materials and consumables is a precondition for the successful operation of any new technology project. This requisite therefore needs considerable attention at the planning stage itself. Tie-up arrangements with the raw material suppliers may be necessary if the suppliers are few.

Import of raw materials in bulk may be necessary, requiring the storage of excess inventory over a period of time, which, in turn, would require additional working capital and thereby increase the project cost. Imports of a particular type of raw material may also be subject to licensing by the Import Trade Control Authorities, bringing in its wake a sense of uncertainty in respect of its availability which is dependent on changes in government policy. All such factors influence a project's success, drawing attention to the necessity for detailed planning for ensuring easy availability of the required raw material. Financial institutions extending loans have to be satisfied on this score as it may prove vital for the successful implementation and running of the project.

Managerial Competence

The ultimate success of even a brilliantly conceived and viable project may depend on how competently it is managed. Besides project implementation, other important functions that need to be controlled can broadly be classified under: Production, Finance, Marketing, and Personnel. A complete integration of all these functions within an organization may be the first step towards effective management.

The project promoter is expected to provide leadership; as such, his qualifications, experience, and track record should be closely examined by the financier. The track record of other projects successfully implemented by the promoter may give the finance institutions a reliable basis for their decision-making in their final approval of the project.

It is also necessary to provide an organization chart which clearly defines the responsibility and decision-making levels of the personnel hierarchy, as also details of the appointments already made/to be made for key functionaries. Professional planning and budgeting, participation of workers in management, decentralized decision-making, and an effective internal control system are some of the factors that would help promote the efficient management of any project.

Commercial and Financial Viability

A technology project is commercially viable only if its product sells at a profit. For this purpose, it is necessary to study the demand-and-supply pattern of that particular product to determine its marketability.

Various methods such as the trend and regression methods may be applied for reliable estimation of product demand, which is then to be matched with the available supply of the particular product. The prospects of exporting the product may also be examined while assessing the demand. If the marketing of the product has already been tied up with foreign collaborators or with some other users, the fact needs to be highlighted, as such a factor has a positive influence on a project's commercial viability. Factors that may influence the supply position, such as licensing of new projects, introduction of new products, and change in import policy, should also be taken into account while estimating a product's marketing potential. This exercise should be conducted over a sufficiently long span, say, 5-10 years, to determine the continued demand of the product during the loan period.

The various steps involved in determining a project's financial viability are covered below.

Determination of Project Cost

A realistic assessment of the project cost is necessary to determine its source of financing and to properly evaluate the project's financial aspects. For this purpose, the various items of cost may be subdivided into as many subheads as possible so that all relevant factors are taken into account while arriving at the total cost. Sufficient cushions may also be provided for any inflationary increase expected during the course of project

implementation. The major items of cost are noted below.

Land and Site Development: The various subheads for estimating the cost of land and its development include:

- cost of land;
- registration and other conveyancing charges;
- cost of levelling and development, if any;
- cost of laying approach road connecting the factory site to the main road;
- cost of internal roads in the factory;
- cost of fencing/compound wall; and
- cost of gates.

Any other expenditure required for the development of the earmarked land to tailor it to the project needs is also to be specifically calculated to arrive at the final cost under this item.

Buildings: The various subheads for estimating expenditure under this item include:

- factory building for the main plant and machinery;
- factory building for auxiliary services such as steam supply, water supply, laboratory, and workshop;
- go-downs, warehouses, and open-air facilities;
- administrative buildings and other miscellaneous non-factory buildings such as canteen, guest house, and time office;
- silos, tanks, and basins and such other structures necessary for the installation of plant and equipment and other civil engineering works;
- garages;
- cost of sewer, drainage, etc;
- residential quarters for essential staff; and
- architect's fee.

The construction cost depends mainly on the type of construction envisaged and also, to some extent, on the type of soil and its load-bearing capacity. A detailed estimate of costs under the abovementioned subheads may preferably be obtained from a reputed firm of civil engineers/architects to avoid any cost overrun at a later stage.

Plant and Machinery: The cost of plant and machinery must include transportation up to the site and other incidental charges as also installation charges. Full details, with broad specifications and the number of equipment to be purchased, in respect of imported as well as indigenous machinery, are to be given separately. The manufacturer's name and details on orders already placed/not made are also to be specified.

The various subheads under this major item include:

- cost of imported machinery, including freight, insurance, loading and unloading charges, customs duty and transportation charges up to the project site;
- cost of indigenous machinery, including transportation charges up to the project site;
- machinery stores and spares; and
- foundation and installation charges.

Technical Know-how Fees: This should also include any expenses on drawings, etc due to foreign collaborators.

Foreign Technicians and Training of Indian Technicians Overseas: The project cost should provide for fees to be paid to foreign technicians as well as training costs of technicians abroad.

Miscellaneous Fixed Assets: This includes:

- furniture;
- office machinery and equipment;
- vehicles such as cars and trucks;
- railway siding;
- laboratory, workshop, and fire-fighting equipment; and
- equipment for power supply, water supply and its treatment, etc.

This list of miscellaneous assets is not exhaustive. The actual list of fixed assets differs from project to project. A reasonable assessment of all the miscellaneous fixed assets essentially required should be made to determine the actual cost under this head. It is important to note here that expenses may sometimes be incurred to acquire patents, trademarks, copyrights, etc, the cost of which is also to be included in the project cost under this head.

Preliminary and Capital Issue Expenses: Some expenditure is to be incurred by the promoter for flotation of the company, preparation of the project report, and so forth. A reasonable estimate of such expenses is therefore necessary and should be shown under this head.

Pre-operative Expenses: A few expenses that would have to be incurred in the pre-operative stage, during the course of project implementation, form a part of the project cost. Such expenses include:

- establishment, including salary to staff;
- rent, rates, and taxes;
- travelling expenses;
- insurance during construction;

- mortgage charges, if any;
- interest on deferred payments and commitment charges on borrowings, if any; and
- other miscellaneous start-up expenses.

Provisions for Contingencies: No estimation of cost, even if done after a detailed examination of all the relevant aspects, can be accurate. It is, therefore, necessary that a reasonable cushion be provided in the estimation of the project's total cost to meet future contingencies, if any, and avoid cost overrun. Cost estimates under the various heads, as already discussed, might have been made either on the basis of firm contracts already entered into at current market rates, which may change due to inflation or some other reasons at the time of placement of firm orders. For instance, some items of expenditure might have been overlooked at the time of estimation of preliminary and pre-operative expenses.

Suitable provisions for such contingencies must be made and supported by valid reasons. The basis of calculation of such provision also needs to be clarified to justify the project's overall cost.

Working Capital: Working capital requirements form an important constituent of the cost of a technology project. The working capital (being a permanent requirement) should preferably be financed from long-term resources, and the necessary estimation for funds under this head should be calculated and included in the project cost.

Sources of Funds/Means of Financing

After estimating the project cost, the next obvious step would be to identify the sources of funds. The project may be financed by contributions from the promoter himself and/or from outside loans, including term loans from financial institutions. The means of financing would include:

- issue of share capital, including ordinary/preference shares;
- issue of secured debentures;
- secured long-term and medium-term loans (including loans for which the application is being put up to the term lending institutions);
- unsecured loans and deposits from promoters, directors, etc; and
- capital subsidy from the central/state governments (if available for the project).

If any additional funds are to be raised from an alternative source, these details should also be provided. It should be noted that the promoter's contribution of share capital and/or loans is shown separately.

Profitability Analysis

After determining the project cost and sources of finance, the project's viability will depend on its capacity to earn profits to service the debts and the capital. To undertake a profitability analysis, it would be

necessary to estimate the cost of production and working results. These estimates, over a long period of time, say, 8-10 years, and the projected profit and loss account for the same period are prepared to draw inference in respect of the expected profit.

Break-even Analysis

An estimation of working results presupposes a definite level of production and sales, and all calculations are based on this level. It may, however, not be possible to realize those levels at all times. The minimum target of production and sale at which the unit will run on a 'no profit-no loss' basis is known as the break-even point, and the first goal of any project would be to reach that target. The break-even point can be expressed in terms of the volume of production or as a percentage of plant capacity utilization. Apart from the accounting break-even point, it would be useful to compute the project's cash break-even point.

Cash Flow

After carrying out a profitability analysis and determining the expected profits, a project cash flow statement for a period, say 8-10 years, is prepared. The cash flow statement gives all the sources of cash available during the course of operation within a period of time (generally one operative year) and the possible utilization of this cash during that period. This helps to ascertain the surplus funds generated during the annual operations. This data indicates the project's capacity to service its debts and to fix the repayment periods of loans granted for a particular project as well as the moratorium period for repayment of the loan. The loan is repaid from the surplus cash generated during the annual operations.

Debt Service Coverage Ratio

The debt service coverage ratio (DSCR) is calculated to assess the project's capacity to service its debt, that is, the repayment of term borrowings and interest. The DSCR is worked out as in equation 2.1:

$$DSCR = n\frac{\begin{array}{c}\text{net profit after tax} + \text{depreciation} + \text{amortisation} \\ + \text{interest on long - term borrowings} + \text{any other non - cash expense}\end{array}}{\text{repayment of term borrowings during the year} + \text{interest on long - term borrowings}} \qquad (2.1)$$

A higher DSCR would give the project the wherewithal to repay its term borrowings and interest as per schedule, even if some of the projections are not fully realized. Normally, a minimum DSCR of 2:1 is fixed by financing institutions, and repayment of the loan is calculated on that basis.

Sensitivity Analysis

Sometimes it may be necessary to carry out a sensitivity analysis to identify elements affecting a project's viability, taking into account the different sets of assumptions. While evaluating profitability projections, the sensitivity analysis may be carried out in relation to changes in the sale price and raw material costs. For

instance, if the sale price is reduced by 5-10%, and raw materials costs increased by 5-10%, the resultant impact of these changes on the DSCR must then be verified. If the new DSCR, so calculated after the changes, still proves that the project is viable, the financial institution may go ahead in funding the project.

Projected Balance Sheet

On the basis of profitability and the cash flow statements already prepared, the projected balance sheet for a period, say, 8-10 years, is also prepared to assess the project's financial position at any given point of time.

Environmental and Economic Viability

The performance of a project may be influenced by not only financial factors but also other external environmental factors - economic, social, and cultural -, which may have a positive as well as a negative impact. The larger projects may be critically evaluated by lending institutions by taking into consideration the following factors:

- employment potential;
- utilization of domestically available raw materials and other facilities;
- development of an industrially backward area as per government policy;
- environmental effects of the project, particularly water and air pollution, if any; arrangements for effective disposal of effluent, as per government policy; and
- energy conservation devices, etc employed for the project.

Other economic factors that influence the final approval of a particular project are: Net Present Value (NPV); Internal Rate of Return (IRR); and Domestic Resources Cost (DRC). Of the NPV and IRR methods, the NPV method should be preferred as it is conceptually sounder.

Social Cost-Benefit Analysis (SCBA)

Apart from financial viability, the larger social aspects of a project also influence financial institutions in their assessment analysis. Two principal approaches for the SCBA are: (i) the UNIDO Approach and (ii) the Little-Mirrlees Approach.

(i) ***UNIDO Approach:*** **This involves five stages:**

1. calculation of the project's financial profitability on the basis of market price;
2. obtaining the project's net benefit in terms of economic efficiency/shadow prices;
3. adjustment for the project's impact on savings and investments;
4. adjustment for the project's impact on income distribution;
5. adjustment for the project's impact on merit and demerit goods.

Since assessment of the project's financial profitability from the point of view of the project promoter as

well as the SCBA is similar, the discussion here is confined to stages 2 to 5 for arriving at the SCBA.

(ii) **Net benefits in terms of economic efficiency/shadow prices**

Since market prices represent shadow prices only under conditions of perfect markets, it is necessary to develop a conceptual framework of shadow prices as the basis to measure a project's net income benefits in countries like India and other Asian countries. The basic issues/concepts related to shadow pricing are as follows:

- The unit of account in which the value of inputs/outputs (resources) is measured is the present net consumption in the hands of people at the base level of consumption in the private sector, in terms of constant price in the domestic accounting currency.
- For tradeable goods, it is possible to substitute import/export for domestic production/consumption and vice versa. The international/border price represents the *real* value of the goods in terms of economic efficiency/shadow pricing of tradeable goods.
- While a project uses/produces resources for any given input/output, it impacts the national economy. The particular area of this impact, that is, increase/decrease in (a) total consumption, or (b) production, or (c) imports/exports, determines the basis of shadow pricing. If the project's impact is on consumption in the economy, the basis of shadow pricing is on consumer willingness to pay; if the impact is on production, the basis is the cost of production; and if the impact is on exports/imports, the basis is foreign exchange value.
- When a project results in (i) diversion of non-traded inputs that are in fixed supply from the producers or (ii) addition to non-traded consumer goods, taxes should be included; but it should be excluded if it augments domestic production by other producers. Taxes should be ignored for fully traded goods.

Shadow Pricing of Specific Resources: The shadow pricing of specific resources covers (a) traded/non-traded goods (input/output); (b) external effects; (c) labour; (d) capital; and (e) foreign exchange. The UNIDO approach to shadow pricing is discussed briefly below.

(a) *Traded/Non-Traded Goods/Inputs and Outputs:* A good is tradeable if an increase in its consumption or production results in a corresponding increase in import/decrease in export or increase in export/decrease in import, respectively. A good is non-tradeable if (1) its import price is more than its domestic cost of production and (2) its export price is less than its domestic cost of production. For a traded good, the shadow price is the international/border price translated in domestic currency at the market exchange rate. The shadow price of a non-traded good is measured in terms of consumer willingness to pay or the cost of production, depending on the project's impact on the rest of the economy.

(b) *External Effects:* Since SCBA seeks to consider all costs and benefits, to whomsoever they may

accrue, external effects should also be taken into account. External effects denote a special class of goods that are incidental to the undertaking of the project. It is neither deliberately created by the project nor is it traded.

External effects may be beneficial or harmful to the economy/society. Beneficial external effects may, *inter alia*, include:

(i) upgradation of workers' skills through training programmes;

(ii) approach road built by the project may improve the transport system in the area; and

(iii) useful information about oil potential in neighbouring fields may be generated by an oil company drilling in its own field.

Examples of harmful external effects are environmental pollution and noise. However, the valuation of external effects is difficult because of their intangible nature and the lack of market price to be used as a starting point. Their values can be estimated only indirectly. For instance, the benefits associated with training programmes of workers may be valued in terms of their increased earning power. Similarly, the benefit from improvement in the transport system – a direct result of an approach road - may be estimated on the basis of benefits associated with the increased activities in the area. The cost of pollution may be computed on the basis of loss of earnings caused by the consequent ill-health and the cost of coping with the unhygienic surroundings.

The principle of shadow pricing may be applied to labour too, though this is considered to be a service. Hiring labour for a project would have three possible impacts on the rest of the economy: (i) it may take away labour from other employment; (ii) it may induce the production of additional/new labour; and (iii) it may involve the import of labour. The shadow price of labour in the first situation is equal to what other users of labour are willing to pay. The social cost/shadow price of labour associated with inducing/producing additional labour consists of the marginal product of labour in previous employment (it is zero in case the worker is unemployed) plus other costs, namely, the value assigned by the worker to the leisure that he would have to forego; the additional consumption of food when fully employed; the cost of transport and rehabilitation in moving workers from one location to another; the negative impact of consumption by the worker on savings/investment in society and the cost of training to improve the worker's skills. The social cost of employing foreign workers is the wage that they earn plus a premium on account of foreign exchange remitted abroad by them from their savings.

(c) *Capital Inputs:* The show price/opportunity cost/social cost of capital depends on how the capital required for the project is generated. If it comes from savings, its opportunity cost is measured by the consumption rate of interest, which reflects the price that the saver must be paid for refraining

from present consumption. To the extent that capital accrues from the denial of capital to alternative projects, its opportunity cost is the rate of return/investment rate of return that would be earned from those alternative projects. In practice, the consumption rate of interest may be used as the discount rate, as in stage three of the UNIDO method where all the inputs/outputs are converted into their consumption equivalents. There are, however, problems in determining the consumption rate of interest empirically. A project's internal rate of return may be used as the basis for estimating the consumption rate.

(d) *Foreign Exchange:* As the UNIDO method uses domestic currency (the rupee in India) as the unit of account in which the value of inputs/outputs is expressed, the foreign exchange impact must be identified and adjusted by an appropriate premium. The shadow price of foreign exchange should be determined on the basis of the marginal social value as revealed by the consumer's willingness to pay for the goods that are allowed to be imported at the margin.

(iii) **Impact on savings and investments**

Stage three of the UNIDO method focuses on measuring a project's value (given the income distribution) in terms of its contribution to savings and investment. For income distribution analysis, that is, income gained/lost by various groups within the society, it identifies the following groups: project, other private business, government, workers, consumers, and the external sector. The gain/loss to any of these groups from a project is the difference between (1) the shadow price and the market price of each input/output in respect of physical resources; and (2) the price based and the value received in respect of financial resources.

(iv) **Impact on distribution of income**

The distribution of income in favour of economically weaker sections/backward regions is a socially desirable objective. In addition to tools such as tax, subsidy, and transfer measure of the government, investment projects are also considered as investments for income redistribution, and their contribution in this respect is considered in this evaluation. Stage (iv) of the UNIDO method relates to measuring a project's impact on income distribution. This requires suitably weighing the net gain/net loss by each group in society to reflect the relative value of income for different groups, and summing them. The weights that essentially reflect political judgements may be determined by an interactive process involving project analysts and the planners/the government.

(v) **Impact on merit and demerit goods**

Stage (v) of the UNIDO model is concerned with adjustment for the project's impact on merit and demerit goods whose social values differ from their economic values. A merit good is one for which the social value exceeds the economic value. Examples of such goods are the production of oil to reduce dependence on

imports, the creation of employment opportunities, etc. In the case of demerit goods such as alcoholic products, the social value is less than the economic value. The procedure to adjust the difference between the social value and the economic value, according to the UNIDO approach, is as follows:

(a) estimate the economic value;

(b) calculate the adjustment factor in terms of the difference between the ratios of social value to economic value and unity;

(c) multiply the economic value by the adjustment factors to obtain the adjustment value; and

(d) add the adjustment value to the project's net present value as computed in stage (iv) above.

To illustrate, assume that the present economic value of the project's output is Rs 50 million, and the social value of the project's output exceeds its economic value by 25%. The adjustment factor (125% ÷ 100% – 1) = 0.25, and the adjustment value (Rs 50 million × 0.25) = Rs 12.5 million. Therefore, the social value of the project's output (Rs 50 million + Rs 12.5 million) = Rs 62.5 million.

Little-Mirrlees (L-M) Approach: The L-M approach to SCBA has many similarities to the UNIDO approach. In the first place, both the approaches use shadow (accounting) prices for foreign exchange savings and unskilled labour, in particular. Similarly, both consider the factor of equity. And, finally, both the approaches use DCF (discounted cash flow) analysis. At the same time, the two approaches differ in important respects. For instance, whereas the UNIDO approach measures costs and benefits on the basis of domestic currency, the L-M approach uses international/border prices. Moreover, the L-M approach uses an uncommitted social income basis, whereas the UNIDO approach is based on consumption as a measure of costs and benefits. Finally, in contrast to the stage-by-stage analysis of the UNIDO approach, the L-M approach focuses on an integrated analysis of considerations such as efficiency, savings, and redistribution. The main elements of the L-M approach are briefly outlined here.

The outputs and inputs of a project are classified by the L-M approach into three categories:

(i) traded goods/services;

(ii) non-traded goods/services; and

(iii) labour.

The computation of their shadow prices is discussed below.

(i) **Traded Goods/Services**

The shadow price of a traded good/service is equal to its border/international price because it represents the appropriate social opportunity cost/benefit of producing/using a traded good/service. Obviously, the shadow price of export would be its FOB (free on board) price; and in the case of import of goods/services, it will be its CIF (cost, insurance, and freight) price.

(ii) **Non-Traded Goods/Services**

The basis of the shadow/accounting price of goods/services, such as land, buildings, transportation, and electricity, which are not amenable to foreign trade, is the marginal social cost/benefit in terms of the shadow prices of resources required to produce an extra unit of the goods/services. The marginal social cost of a bus travel/trip, for instance, would approximate the cost of material input such as fuel, oil, and so on at the international/border price plus the driver's and conductor's social wage. The marginal social benefit is the value of an extra unit of the goods from the social point of view. For instance, if an item is consumed by only one income group and is not taxed, its marginal social benefit would equal its market price multiplied by a factor representing the value assigned to an increase in the income of that group in relation to an equal increase in uncommitted social income.

In practice, the calculation of marginal social cost/benefit is a tedious job. The L-M approach has suggested that, as a practical expedient, the monetary cost of a non-traded item be broken down into three components, namely, (1) tradeable, (2) labour, and (3) residual. Components (1) and (3) may be converted into the social cost by applying social conversion factors.

SCBA by Financial Institutions in India

Financial institutions in India basically focus on three aspects of a project, namely, economic rate of return, effective rate of protection (ERP), and domestic resource cost (DRC).

Economic Rate of Return: The method followed by financial institutions in India to compute the economic rate of return is based on the L-M method. However, the L-M method is followed only partially, presumably to reflect the prevailing situation in the country. The main elements of the method used by financial institutions are as follows:

- It uses international/border prices as a substitute for market price for valuation of non-labour tradeable inputs/outputs.
- Where international prices are directly available, it uses CIF prices for inputs (imports) and FOB prices for outputs (exports).

If border prices are not readily available for tradeable items, as also for non-tradeable items such as electricity and transportation, social conversion factors are used to convert actual (rupee) cost into social cost. Whereas in some cases such as land, a social conversion factor is applied directly to the actual domestic (rupee) cost, in other cases such as transport, the domestic cost is broken down into three components: (i) tradeable, (ii) labour, and (iii) residual. These components are in turn converted separately into the social cost.

Effective Rate of Protection (ERP): The ERP is a measure of the shelter/protection available to a project in terms of tariffs, import restrictions, and subsidies to encourage domestic industries and protect them against foreign competition. It is computed as in equation 2.2.

ERP(%) = value added at domestic price – value added at world price x 100 (2.2)
value added at world prices

The higher the value of ERP, the higher is the implied protection available to the project. When ERP is zero, the project does not enjoy any protection. The extent of protection to a project generally does not exceed 30%. The data required to compute ERP are: (a) selling price (1) at domestic prices net of taxes/excise duties but inclusive of a reasonable selling commission, and (2) at world prices, that is, CIF price for imports and FOB price for exports; (b) if input cost is divided into (i) traded and (ii) non-traded; and (c) value-added (a – b) represents payments to capital and labour. The import cost includes the cost of raw materials/stores; power, fuel, and water; repairs and maintenance; a part of the administrative overheads/expenses and selling expenses. Traded inputs are valued both at domestic and world prices, whereas non-traded inputs are valued at domestic prices only. The input of raw material/stores is generally a traded item; but raw materials that have (1) a low value-to-volume ratio and involve disproportionately high transport and (2) are not imported are treated as non-traded items. Power, fuel, and water are normally treated as non-traded. However, when fuel costs are significant, as in the case of oil/coal, fuel is treated as traded and valued at both domestic and world prices. Repairs and maintenance, unless entailing substantial consumption, are treated as non-traded items. Selling expenses are regarded as non-traded. A part of the administrative overheads/expenses included here is exclusive of labour costs, which are a part of the value-added category. Included in them are expenses such as rent, insurance charges, and telephone tariff, which are treated as non-traded.

Domestic Resource Cost (DRC): The DRC shows the domestic cost incurred per unit of foreign exchange saved/earned. Financial institutions in India calculate DRC as in equation 2.3:

$$DRC = \frac{A + B + C}{P - (Q + R + S + T)} \times e\text{xchange rate} \qquad (3)\ (2.3)$$

where *A* is the annual charge on domestic capital at 10% (the domestic capital consisting of (a) the cost of domestic plant, machinery, miscellaneous fixed assets, excluding excise duty/sales tax, (b) preliminary/pre-operative expenses, exclusive of interest during construction, (c) clearing and local transport cost of imported machinery, and (d) working capital investment other than investment in imported and tradeable raw material inventory);

B is the annual description on domestic capital assets (other than land) at 10%;

C is the cost of non-traded inputs (say, administrative and selling expenses);

P is the sales realization at international prices, i.e. CIF (cost, insurance, and freight) price for an

imported/importable/import substitute good and FOB (free on board) price for an export/exportable good;

Q is the annual charge on imported capital asset at 10% (consisting of (a) cost of imported plant, machinery, and miscellaneous fixed assets, excluding import duties and (b) working capital investment in imported and tradeable raw material inventory, net of all taxes/duties);

R is the annual depreciation on imported capital assets at 8 %;

S is the annual cost of imported operating inputs valued at the actual price paid for them, excluding import duty (local transportation cost is treated as a domestic cost); and

T is the annual cost of domestically procured but tradeable inputs:(a) traded/tradeable inputs at international prices and (b) non-traded inputs valued at their domestic cost, excluding transfer payments such as taxes, duties, and subsidies.

Since taxes, duties, and subsidies are merely transfer payments to, or from, the government and do not represent a cost/gain to the economy as a whole, these are excluded from the valuation of all the items. If the DRC per US $ saved is lower than the prevailing exchange rate, it is desirable to manufacture the product indigenously rather than import it.

Section 2.3 SUMMARY

- A project requires two types of funds: long-term funds to finance the purchase of immovable assets; and working capital funds. A major source of long-term funds is a term loan from banks and financial institutions. Working capital funds in India are provided by banks only.
- The maturity period of a term loan is typically 6-10 years. Term loans are negotiated between borrowers and lenders. While the assets financed by a term loan serve as primary security, all the other assets of the borrower provide collateral security.
- To protect their interest, lenders reinforce the asset security stipulations with covenants relating to assets, liabilities, cash flows, and control. The assets-related covenants are intended to ensure the maintenance of a minimum asset base whereas the cash-related covenants are intended to restrain the borrower's cash outflows. The control-related covenants aim at ensuring competent management for the borrowers. The other positive covenants include maintenance of minimum working capital and net worth and creation of a loan redemption fund.
- Term loans are amortized according to a repayment schedule. The repayment has two components: interest and repayment of principal; and loan amortization has two modes: equal principal payment and equal instalment.
- The term loan negotiation includes the contents of the application form for loan, details of the project, documentation and disbursement of loan, utilization of loan, charging of securities, and registration of charges.

- Lending institutions and banks carry out a thorough scrutiny of a project submitted to them for financing. The appraisal covers the following aspects of the project: technical feasibility, managerial compliance, commercial and financial viability, and economic and environmental viability. The focus of appraisal by the lenders is on verifying the details included in the project submitted by the borrowers.
- A detailed, thorough, and sound financial appraisal of technology transfer projects acts as a built-in mechanism for managing/reducing risk for financial institutions. In operational terms, it implies that funding institutions finance commercially profitable and financially sound technology projects. As a result, they are likely to have their monies returned in time; there is a low probability of default on the part of borrowing units.
- The purpose of technical analysis is to ensure that the project is technically feasible in terms of the availability of all inputs and to facilitate optimal formulation of a project in terms of technology, size, location, etc. The main elements of technical feasibility are: technology; technical arrangements; material inputs; product mix; plant capacity; location; machinery and equipment; structure and civil work; environmental dimensions; project layout; and implementation schedule.
- The financial analysis/appraisal of a project covers aspects such as cost of project; means of financing; estimates of sales and production; cost of production; working capital requirements and their financing; profitability projections; projected cash flow statements; and balance sheets.
- The project cost is the total of all items of outlay financed by long-term funds, including the cost of land and site development; building and civil works; plant and machinery; technical know-how; preliminary expenses; pre-operative expenses; provision for contingencies; and margin money for working capital and initial cash losses.
- Working capital requirements include indigenous/imported raw materials/components, work-in-process, finished goods, receivables, operating expenses, and consumable stores.
- Profitability projections/estimates of working results should be made over a suitably long period (say, 6-10 years), detailing all projected revenues and costs.
- Projected cash flow statements should be prepared on a half-yearly basis for the construction period and on an annual basis for the operating period for managerial purposes.
- SCBA is an evaluation of a project from the broader social angle. The focus is on a project's social costs and benefits in contrast to monetary/commercial costs and benefits. Included in SCBA are considerations such as economic benefits and costs of the project on income distribution in society; level of savings and investments in the economy; and the project's contribution to economic self-sufficiency, employment, and social order.
- Two principal approaches for SCBA are the UNIDO Approach and the Little-Mirrlees Approach.

CHAPTER 3. ASSESSING AND MANAGING RISK IN FUNDING TECHNOLOGY TRANSFER PROJECTS: CASE FOR A SCORING AND RATING MODEL

The objective of this chapter is to provide a scoring/rating scheme that can be used by banks and financial institutions in assessing and managing the risk in funding technology transfer projects. The assessment of project risk (in terms of numerical score) would greatly benefit the funding institutions (including banks) not only in deciding whether to finance a project or not but also in determining the rate of interest to be charged from the borrowing unit. Thus, the scoring scheme is an operational/conceptual framework of an integrated appraisal of all the major aspects related to a project. It would be useful to give a brief account of the various risks to which financial institutions and banks are exposed in financing technology transfer projects.

For better exposition, the subject matter of this chapter is divided into four sections. Section 3.1 briefly identifies the various risks that may be encountered. Section 3.2 covers credit risk management. Section 3.3 focuses on credit risk scoring and rating models (used in India as per the RBI guidelines). And the concluding observations are noted in section 3.4.

Section 3.1 RISKS ENCOUNTERED IN FINANCING PROJECTS

Risks for financial institutions/banks in financing projects can be grouped under two broad categories: business-related risks and control-related risks.

Business-Related Risks

The business-related risks to which institutions/banks are exposed are associated with their operational activities and market environment. They fall into six categories:

(i) credit risk;
(ii) market risk comprising interest rate risk, foreign exchange risk, equity price risk;
(iii) commodity price risk and liquidity risk;
(iv) country risk;
(v) business environment risk; and
(vi) operational risk.

Credit Risk

Credit risk is a major risk, which is inherent to any venture in the financing of projects. It is defined as the possibility of losses associated with a diminution in the borrower's credit quality. In a bank's credit portfolio, losses stem from outright default due to the borrower's/counterparty's inability or unwillingness to meet their commitments, as also due to the risk inherent in the nature of business activity and environment.

Credit risk relating to borrower(s) may arise due to the non-payment of the principal/interest amount; the non-payment of guarantee or letter of credit liabilities on devolvement; in the case of export business, the non-receipt of proceeds against bills financed; in the case of security trading, funds/securities settlement not being effected; in the case of cross-border exposure, funds not received due to seizure or restrictions imposed by the sovereign; and so on. With regard to risks related to the business activity financed, these may include obsolescence of technology/product(s) design, competition, inadequate supply of inputs, lack of infrastructural facilities, government rules/regulations, etc.

Market Risk

Market risk arises from changes in the market variables having an adverse impact on an institution's earnings or its capital. These variables may include unfavourable changes in the interest rates, foreign exchange rates, equity prices, commodity prices, and so on. The various risks associated with market risks are discussed below.

Interest Rate Risk: This risk, which forms a part of the market risk, has become more prominent after RBI lifted regulatory interest rates restrictions on banks. This deregulation of interest rates has caused keen competition and exposed banks to a greater interest rate risk. A bank's net interest income, i.e. the difference between interest received on its assets (loans/advances, investments) and interest paid on its liabilities (deposits), which is a major source of profitability, has been shrinking.

Foreign Exchange (Forex) Risk: This risk is caused by an adverse exchange rate movement which affects a bank's foreign currency exposures when it is holding foreign exchange assets or liabilities that have not been hedged. Forex risk may include three types of commonly understood risks: transaction exposure, translation exposure, and economic exposure.

Equity Price Risk: The risk of a sharp downswing in equity prices exposes banks to unexpected losses in the capital market.

Commodity Price Risk: A commodity is defined as a physical product that is or can be traded on a secondary market, for example, agriculture products, minerals, oils, and precious metals. The commodity price risk is often quite complex and more volatile than risks associated with currencies or interest rates. Banks in developed markets use derivatives to hedge the commodity price risk.

Liquidity Risk: This risk is caused by a mismatch in the maturity of assets and liabilities. Bank deposits generally have a much shorter contractual maturity than loans, and liquidity management needs to provide a cushion to cover anticipated deposit withdrawals. Liquidity risk may arise when a bank is unable to meet its

liabilities as these become due for payment and it may have to fund the same at a much higher cost than the market cost. This may happen due to a mismatch of the timings of inflows and outflows of funds and from the funding of long-term assets by short-term liabilities. Banks with a surplus liquidity may also suffer due to the idling of funds.

Country Risk

Country risk arises due to cross-border lending and investment, particularly when a foreign country is unable to service and repay its debts. The country risk may include the risk arising out of a currency transfer problem, the political currency situation in the country, and/or a cross-border risk.

Currency Transfer Risk: Such a risk arises when a borrower may be able to repay his debt in its local currency, but not in foreign currency. This type of situation may arise when foreign exchange shortages restrict a country's cross-border foreign exchange market.

Political Risk/Non-sovereign Risk: Such a risk arises when the borrower is not able to repatriate the funds due to restrictions imposed for political reasons. Non-sovereign risk may include risks associated with the economic environment, legislative process, and the legal framework of the borrower-country, as also risks of appropriation and expropriation.

Cross-border Risk: Such a risk may arise when the borrower is a resident of a country other than where the cross-border assets are booked, and includes exposures to local residents, denominated in currencies other than the local currency.

Sovereign Risk: This risk is associated with lending to the government or opting for their guarantee, particularly when they claim immunity from legal process or might not abide by a judgment, and it might prove difficult to secure redress through legal action.

Business Environment Risk

Business environment risk can arise when lending policies/strategies, particularly those relating to identification of target markets, products, and customer base, are not professionally planned, and assessment of the business environment is inadequate.

Operational Risk

Operational risk is caused due to deficient and fast-changing internal processes/systems/procedures; non-conducive work environment; dispirited, untrained, and incompetent staff; external events; etc. Operational risk may also be caused when the financial institution's/bank's actions do not conform with the country's laws; or they may arise due to a lack of knowledge of the laws of other countries, particularly in a foreign

exchange business, cross-border dealings, etc. In addition, they are faced with technology risks, which may arise due to the outsourcing of their various activities; hurried, unplanned computerization; and IT-related factors, such as errors in the computer programming, lack of security, inefficient back-up and disaster recovery systems, etc. Operational risk can also arise due to the use of obsolete or untested technology which is out of sync with the business needs, the lack of trained staff or their negative response to new technology, etc.

Control-Related Risks

Control-related risks arise out of an absence/lack of control and of supervisory systems. Institutions/banks have their own control systems. For loans, they have systems for appraisal, monitoring/follow-up, surveillance, and inspection/audit. They are also evolving credit risk evaluation, and rating and management systems. For ensuring proper housekeeping, they have set guidelines as also a system of concurrent audit of their branches offices.

Section 3.2 CREDIT RISK MANAGEMENT

As a step towards enhancing and fine-tuning the existing risk management practices of commercial banks, RBI has prescribed (as of 2001) a comprehensive risk management framework for these institutions. This section focuses on the three main elements of the framework:

(i) credit risk policies and procedures;

(ii) organizational structure for effective credit administration and risk management functions; and

(iii) credit risk rating framework (including credit risk scoring and rating models).

Credit Policies and Procedures

As per RBI guidelines, every bank needs to prepare a comprehensive and well articulated, written credit policy document, highlighting the strategy, policies, and procedures for effective management of credit and mitigation of credit risks. The credit policies and procedures in this document, which requires the approval of the bank's Board of Directors, should have the following features:

- Identification by banks of industries/business activities that are doing well and have encouraging outlook/potential for growth. Such activities should be placed under target/preferred credits while others that are not doing as well and have uncertain prospects/default risk may be kept under a watch list wherein exposures are contained/reduced.
- Delegation of loan approving/sanctioning powers of officials, linking the same with the borrower's risk rating. The level of the loan sanctioning authority may increase as the risk rating worsens.
- Linking the credit risk scoring and rating system and risk acceptance criteria with the borrower's risk

rating so that no loan proposal below a certain cut-off level is entertained. The conditions under which deviations can be made by the sanctioning authority and the level of authority required to ratify the deviations should also be specified.

- Specification of prudential exposure limits for loans to individuals and groups of borrowers, as also for different industries/sensitive sectors as a proportion of the bank's capital funds.
- Survey of concentration risks in terms of industry, sector, and regional exposures as also the steps that need to be taken for credit dispersions to mitigate concentration risk. Banks should lay down a system to conduct a regular analysis of the credit portfolio for an ongoing control of risk concentration.
- Review of the loan mechanism and renewal systems, relating their frequency with the borrower's risk rating: more frequent review of loans under high-risk categories.
- Effective systems of monitoring the borrower's operational/financial performance, as also the conduct of their bank accounts so that the outstanding remains within limits. The monitoring system may vary depending upon the type of borrower, namely, normal borrower, sick/rehabilitated unit, suit file/decreed account, one with whom the bank has entered into a compromise settlement for the recovery of its dues, etc.
- Analysis of the system/procedure for judging creditworthiness on an ongoing basis as also any migration of credit from low- to high-risk categories and *vice versa*.
- Clear guidelines for pre-sanction appraisal and monitoring of funded and non-funded exposures, which can get converted into funded liabilities in case the customer does not meet his commitment.
- Estimation of Forex risks, which may comprise transfer risk, currency risk, cross- border risk, sovereign risks, non-sovereign risk, political risk, etc, and definition of country-wise exposure limits based on an analytical review and guidelines so as to mitigate such risk.
- Formulation of policies and setting up of limits for inter-bank exposures based on internal/external ratings or any other prudential parameters.
- Guidelines on multiple credit approver, making financial sanctions subject to approvals at various stages, namely, credit risk rating, risk approvals, credit approval grid, etc.
- Development of a consistent approach towards early recognition of a problem, exposures, and remedial actions, by using appropriate rehabilitating, restructuring schemes.
- Establishment of proactive policies such as periodical industry studies, plant visits, periodical credit calls that are documented, system of review of troubled/weak exposures, etc.
- Formulation of bank policies to decide the maximum prudential exposure limits for financing new technology transfer projects.
- Mechanism of loan pricing (interest rates fixation) for borrowers, linking it with their risk categorization. A higher interest rate may be charged from borrowers in a higher risk category.
- Creation of an independent set-up for credit risk management, credit risk audit, and loan review mechanism, in line with RBI guidelines and depending upon the type/size of the banking institutions.

It is not only important to evolve policies and procedures for the management of credit risk, but also to ensure that these are properly communicated to the various functionaries and are implemented in earnest. Further, these policies/procedures have to be periodically reviewed at the top management/Board level so that necessary amendments are made, wherever required, for their better implementation.

Organizational Structure for Effective Credit Administration and Risk

Management Function

As per RBI guidelines, for a successful implementation of an effective credit administration and risk management system, banks should create a sound organizational structure, with the following basic features:

Board of Directors' Functions Relating to Risk Management

The functions of the Board of Directors relating to risk management are listed below.

- The Board of Directors should have the overall responsibility for the management of credit and other risks. Banks may set up a Board level sub-committee which should effectively coordinate between the various committees, namely, the Credit Risk Management Committee (CRMC), the Asset Liability Management Committee (ALCO), and the Operational Risk Management Committee (ORMC).
- The Credit Risk Management Committee (CRMC) should be headed by the bank's Chairman/Chief Executive Officer (CEO) or Executive Director (ED) and should comprise heads of the Credit Administration Department (CAD), Credit Risk Management Department (CRMD), Treasury Department, and the Chief Economist. The size of the committee may depend upon the size of the bank and its loan book.
- The CRMC may undertake the following broad functions:
  - be responsible for the implementation of the credit risk policy/strategy, approved by the Board of Directors (Board);
  - monitor credit risk on a bank-wide basis and ensure compliance with limits approved by the Board;
  - recommend to the Board, for their approval, a clear policy on the standards for presentation of credit proposals, financial covenants, rating standards, and benchmarks;
  - determine the delegation of credit-approving powers, prudential limits on large credit exposures, standards for loan collaterals, portfolio management, loan review mechanism, risk concentration, risk monitoring and evaluation, pricing of loans, provisioning, and regulatory/legal compliances. The Credit Risk Management Department (CRMD) should be independent of the Credit Administration Department (CAD). The broad functions of the CRMD and CAD are listed below.

Functions of CRMD

The functions of CRMD would, *inter alia*, include the following:

- laying down risk assessment systems, developing the MIS, monitoring the quality of loan, or investment portfolio, identifying problems, and correcting deficiencies;
- enforcing compliance with the risk parameters and prudential limits set up by the CRMC/Board;
- measuring, controlling, and managing credit risk on a bank-wide basis, within the limits set up by the Board/CRMC;
- being accountable for protecting the quality of the entire loan/investment portfolio (department should undertake portfolio evaluations and conduct comprehensive studies on the environment);
  undertaking loan review/audit to determine the resilience of the loan portfolio.

Functions of CAD

The functions of CAD would, *inter alia*, include the following:

- business development and customer relationship management;.
- transaction management, i.e., risk assessment, loan pricing, loan approvals, and structuring the facilities to be offered, as also documentation, loan administration, ongoing monitoring, and risk measurement; and
- monitoring the portfolio, if so required in the portfolio management phase, at a macro level, and management of problem loans.

In addition, banks should have independent set-ups to perform functions such as risk rating of borrowers, monitoring/review of loans, and credit risk audit.

Credit Risk Rating Framework

The RBI credit risk rating framework is discussed below, with reference to (a) definition of credit risk, (b) factors causing credit risk, and (c) guidelines.

Definition

Credit risk is the possibility of losses associated with a diminution in the creditworthiness of borrowers/counterparties. In a bank's credit portfolio, losses stem from outright default due to a customer's/counterparty's inability or unwillingness to meet his commitments in respect of lending, trading, settlement, and other financial transactions. Alternatively, losses result from a reduction in the portfolio value which arises from actual or perceived deterioration in creditworthiness.

Credit risk derives from the bank's dealings with an individual, a corporate, another bank or financial institution, or a sovereign and may take any of the following forms:

- In the case of direct lending: the principal and/or interest amount may not be repaid.
- In the case of guarantees or a letter of credits: funds may not accrue from the constituents upon

crystallization of the liability.

- In the case of cross-border exposure: availability and free transfer of foreign currency funds may either be frozen or restrictions imposed by the action of, or because of, political/economic conditions in the country where the borrower is located.

Factors

The factors causing credit risk and having an adverse impact on creditworthiness, *inter alia*, include:

- deficiencies in the appraisal of loan proposals and the assessment of the borrowers' creditworthiness/ financial strength;
- inadequately defined lending policies and procedures;
- high prudential exposure limits for an individual and a group of borrowers;
- absence of credit concentration limits for various industries/business segments;
- inadequate value of collaterals obtained by the banks to secure the loan facilities;
- over-optimistic assessment of thrust/potential areas of credit;
- liberal loan sanctioning powers for bank executives without checks and balances;
- liberal sanctioning of non-fund based limits without proper scrutiny of the borrowers' activity, financial strength, cash flows, etc;
- lack of knowledge and skills in officials processing loan proposals, and subjectivity in credit decisions;
- lack of effective monitoring and consistent approach towards an early recognition of problem accounts for the initiation of timely remedial actions;
- lack of information on the functioning of various industries and performance of economy;
- lack of proper coordination between the various departments of banks looking into credit functions;
- lack of a well-defined organizational structure and clarity with regard to responsibilities, authorities, and communication channels;
- lack of a proper system of credit risk rating, quantifying, and managing across geographical and product lines;
- lack of effectiveness of the existing credit inspection and audit system and slow progress in eliminating the deficiencies as revealed during inspection/audit of branches and controlling offices;
- lack of reliability and strength of data being used for managing credit and risks associated with lending; and
- over-emphasis on staff accountability and, as a result, demoralizing the staff and failing to review credit decisions.

The abovementioned illustrative factors, which may have an adverse impact on the quality of a bank's credit

portfolio, can be remedied only if the banks evolve efficient credit administration and risk management systems. These may include the formulation of well articulated policies/procedures, creating an effective organizational structure manned by well trained and committed personnel.

Guidelines[1]

According to RBI Guidelines, banks should evolve a comprehensive risk scoring/rating framework, which serves as a single point indicator of a borrower's/counterparty's diverse risk factors, to aid consistency in credit decision-making.. The rating system should be so designed as to have a substantial degree of standardization and thereby help in revealing the overall risk of lending, setting pricing and non-price terms of loans as also present meaningful information for the review and management of the loan portfolio. The risk rating should reflect the credit risk and the loan portfolio's quality.

The risk rating framework should be drawn up in a structured manner, with scope for banks to use any number of operational parameters, financial ratios, and collaterals, as also qualitative aspects of management and industry characteristics that may have a bearing on the borrower's creditworthiness. Banks should also examine the borrower's foreign exposures, particularly those that are not hedged, and factor these into their risk rating framework, as such exposures can alter their risk profile. Further, banks, as a matter of prudent risk management policy, should also prescribe the minimum rating below which no exposures would be undertaken; any flexibility in the minimum standards and conditions for relaxation and authority should be articulated and documented in the loan policy.

Banks should conduct the credit risk assessment, normally at quarterly intervals or at least at half-yearly intervals, to gauge the quality of the borrower's credit portfolio. Any variations in the borrower's rating over a period of time would indicate deviations in their creditworthiness. In order to ensure the consistency and accuracy of ratings, the responsibility of setting and confirming such ratings should vest with the loan review function and should be examined by an independent Loan Review Group.

The indicative parameters for credit risk rating should include: Debt-Equity Ratio; Debt-Service Coverage Ratio (DSCR); Return on Capital Employed (ROCE); Operating Profit Margin; Gross Revenue; etc. In addition, the rating scale may consist of 9 levels, of which 1-5 may represent acceptable credit risk while 6-9 would be unacceptable. Each level of rating may be allotted a suitable alphabetic prefix to mark the individual ratings scale distinct and unique.

Structure: The risk-rating structure should serve the following purposes:

- **Taking credit decision:** This is the decision on whether or not to extend a loan to a borrower. Obviously, a borrower with a high rating would be financed.

- **Pricing of loans:** A borrower falling in a higher risk category would be required to pay a higher interest rate.
- **Mitigation of risk:** The extent of a borrower's contribution in the form of margin and collaterals can be demanded on the basis of the borrower's risk-rating category.
- **Nature of facilities:** Whether to sanction cash credit, a term loan, or a demand loan may depend upon the borrower's risk categorization. A demand loan or a term loan for a shorter period may be considered where the risk involved is high.
- **Delegation of loaning power:** Higher loaning powers may be vested with the field functionaries for the sanction of loans to borrowers who are rated secure, with practically no risk. For borrowers falling under high-risk categories, the approval of loans should be considered by more senior authorities.
- **Migration of credit:** Effective monitoring of the overall credit portfolio entails scrutiny of the movement and migration of the portfolio from higher to lower risk categories and vice versa.
- **Management of credit risk:** Banks need to undertake effective management of credit risk by evolving robust credit policies and procedures which are sensitive and responsive to change.
- **Identification of thrust areas:** Thrust areas of credit – those that are looking up and safe as also those that are risky with a high default rate – need to be identified.

Risk-based Audit System

A risk-based audit system plays an important role in an effective 'Credit Risk Management and Control System', helping to ensure regulatory compliances by providing high quality counsel to the top management of banks. So far, the internal audit systems of banks have been concentrating on transaction testing, ensuring accuracy and dependability of accounting records, reliability and timely submission of control returns, etc. However, in the changing scenario, particularly when RBI is also moving towards risk-based supervision, banks should widen and redirect the scope of their internal audit with the purpose of evaluation of the adequacy and effectiveness of risk management policies and procedures and internal control systems. Further, the internal risk-based audit function should be independent and entrusted to officials who are well trained and can perform the job objectively and impartially. Banks should determine the scope of risk-based internal audit for low-, medium-, high-, and extremely high-risk areas. Their audit reports should, at the minimum, fulfill the following:

- ensure reliability of the process by which risks are identified and managed in various areas;
- ensure reliability of the process by which risks are identified and managed in various areas;
- identify fraud-prone areas, plugging gaps, if any, in the control mechanism, which might lead to frauds;
- verify compliance of established policies/procedures and regulatory compliance with regard to the

[1] Quoted in Khan, M.Y. 2007. Indian Financial System. Tata McGraw Hill, New Delhi, Chapter 12.

sanction of loans;

- examine the effectiveness of the control system which picks up early warning signals, and suggest remedial measures;
- assess the integrity and reliability of data and its timely preparation and submission by the offices concerned;
- ascertain the status of budgetary control and performance reviews;
- test/verify transactions related to assets, to the extent considered necessary;
- monitor compliances with risk-based internal audit reports;
- review current systems whose function is to ensure compliances with money laundering controls; identify potential inherent business risks and control risks, if any;
- suggest various corrective measures and undertake follow-up reviews to monitor the actions taken thereon.

Risk-based audit is expected to bolster the ongoing risk management in banks by providing the necessary checks and balances in the system. For the effectiveness of a risk-based audit, banks should establish a well-defined set-up, indicating the roles, responsibilities, and communication channels between the risk-based internal audit staff and management. This would encourage the disclosure of negative and sensitive findings, which would, in turn, help in initiating corrective actions to remedy the ills.

In brief, a well-designed credit risk scoring/rating framework can aid banks in identifying, quantifying, aggregating, and managing risk across geographical and product lines. The rating framework facilitates the various exercises related to funding: credit decisions; pricing; evolving effective credit policies/procedures; avoiding credit concentration; capital structure decisions; etc. For designing an effective risk-rating structure and its implementation, banks should create a proper organizational set-up, manned by a staff who is not only qualified and experienced, but also has a positive outlook. The staff identified for the purpose should also be provided with intensive training, which is structured and designed after considering the best of proven international procedures/practices. Such a reliable framework (used by commercial banks in India) merits adoption by financial institutions in their assessment and management of risks when funding technology transfer projects.

Section 3.3 CREDIT RISK SCORING AND RATING MODELS

Scoring and rating systems would enable banks to classify technology projects under various risk categories. Though the parameters used by banks have many common features, their scores and the number of risk categories vary widely, depending upon their individual risk perception. The evaluation of these parameters also varies as some banks assess them against certain benchmarks on a stand-alone basis, whereas others use the moving average method to allot scores by comparing these with the performance of peer units.

Parameters

The parameters used in the risk scoring and rating systems can be broadly grouped under the following four heads:

- operational and financial performance of the unit;
- bank accounts and securities available;
- business/industry outlook; and
- promoters/management.

Some parameters, particularly those related to evaluation of the management, are qualitative in nature.

Operational and Financial Performance of the Unit

The parameters generally used by banks under the operational/functional performance are listed below:

- plant capacity utilization in relation to installed capacity;
- break-even point in relation to installed plant capacity;
- sales trend during the previous three years;
- profit trend during the previous three years;
- achievement of sales projections;
- achievement of profit projections;
- net profit to net sales ratio;
- return on capital employed;
- ratio of current assets to current liabilities;
- debt-equity ratio (DER);
- debt service coverage ratio (DSCR);
- ratio of net sales per annum to working capital;
- ratio of net sales per annum to fixed/total assets;
- inventory turnover ratio;
- average collection period of receivables;
- average payment period of accounts payable, etc.

Bank Accounts and Securities Available

The parameters generally included under the head of bank accounts and securities are:

- performance of fund and non-fund based accounts with banks/financial institutions: whether these are regular/irregular;
- compliance of the terms/conditions stipulated by banks/financial institutions while sanctioning the loans;
- position of the annual renewal/review of the loan facilities;
- position with regard to the submission of the balance sheet and profit/loss accounts, monitoring data,

inventory statement, etc;

- nature and value of securities (primary/collateral) offered to cover the loan facilities;
- validity of the creation of charge on the securities;
- interest and other income being earned by the banks;
- tenability of the loan documents in the law court;
- position of contingent liabilities, if any;
- transparency and disclosures in the audited annual accounts;
- diversion of short-term funds for long-term users;
- unauthorized withdrawals of funds for personal use or diversion of funds for investments in allied/associate and other firms;
- utilization of loans sanctioned by banks/financial institutions (FIs) for purposes other than those for which these have been loaned; and
- auditor's comments on the quality and valuation of current/fixed assets.

Business and Industry Outlook

The relevant parameters under the head of business and industry outlook are:

- intensity of the market competition faced by the industry;
- technology used, whether it is successfully implemented, and chances of its obsolescence;
- market demand and growth potential for the products;
- quality of product(s) and their market acceptability;
- competition from substitutes -- those available and others likely to come on the market;
- export potential of the products;
- position with regard to the availability of raw material;
- import barriers, if any, imposed by the government;
- units' location advantages and disadvantages;
- general outlook and capital market perception of the industry;
- threat of dumping products by foreign companies;
- type of product(s) – whether customized or for general use;
- foreign exchange component (risk) in the total business, covering both exports and imports;
- nature of product(s), their applications, and shelf life;
- volatility of prices of finished goods and basic inputs/material used; and
- fluctuations in demand/supply of products, both current and future.

Promoters/Management

The important parameters under the head of promoters/management are the following:

- ownership pattern of the unit, that is, whether public/private limited, proprietorship, etc;
- qualifications, experience, and knowledge of industry/business;
- integrity, commitment, and sincerity;
- market reputation and credibility;
- track record of debt repayment;
- financial strength and capacity to raise more funds;
- pending statutory dues and litigations, if any;
- functioning of and support from other group companies;
- turnover of top management personnel;
- history of dividends/bonus issues declared; and
- future succession plan.

Suggested Credit Risk Scoring and Rating Model

The parameters identified in the RBI guidelines in terms of the abovementioned four broad heads are used as the basis for our typical scoring and rating model illustrated below (equally adaptable for technology transfer projects).

Operational and Financial Performance (maximum score: 80)

The unit's operational performance may be rated from certain parameters such as plant capacity utilization and achievement of sales and profit projections; and the financial performance may be assessed from parameters such as current ratio, return on the capital investment, debt-service coverage, debt-equity ratio, and cash flow positions. All such parameters are to be evaluated, indicating the scores to be allotted against each one, as specified below.

Plant Capacity Utilization (maximum score: 10): This parameter is important as it reveals a lot about the unit's functioning. Low plant capacity utilization, which is a disturbing feature, can be due to various reasons, such as lack of demand, imbalance in plant/machinery, and frequent breakdowns due to the many years of plant usage. Whatever the reason, low utilization of a plant has an adverse effect on the unit's functioning and, ultimately, on its profitability. It would be desirable to compare this parameter with the average capacity utilization of peer units engaged in a similar activity with plant/machinery of approximately the same installed capacity. In case the average capacity utilization of a peer is *X*, then the scores allotted for the various levels of plant capacity utilization may be as in Table 3.1.

Table 3.1

Plant capacity utilization	*> 1.25X*	*1.10X to 1.25X*	*X to < 1.10X*	*0.9X to < X*	*0.8X to 0.9X*	*.70X to 0.80X*	*<0.70X*
Score	10	9	8	6	4	2	0

In case the data about units is not available, the score may be allotted on the basis of a comparison of the actual utilization of the plant capacity with the projections accepted by the bank while sanctioning the loan, as given in Table 3.2.

Table 3.2

Plant capacity utilization (% usage of projections)	*100% or more*	*95-99%*	*90-94%*	*85-89%*	*80-84%*	*75-79%*	*<75%*
Score	10	9	8	6	4	2	0

Achievement of Net Sales Projections (maximum score: 10): A comparison of the actual net sales with the projected estimate is an important indicator of a unit's efficient functioning. Such a scoring for this parameter would appear as in Table 3.3.

Table 3.3

Percentage achievement of net sales projection	*95% and more*	*90% to < 95%*	*85% to < 90%*	*80% to < 85%*	*75% to < 80%*	*Below 75%*
Score	10	9	7	5	3	0

Achievement of Net Profit Projections (maximum score: 10): A comparison of the actual net profit with the projected figures is an important indicator of a unit's efficient functioning and control on its expenditure. Such a scoring for this parameter would appear as in Table 3.4.

Table 3.4

Percentage achievement of net profit projection	*95% and more*	*90% to < 95%*	*85% to < 90%*	*80% to < 85%*	*75% to < 80%*	*Below 75%*
Score	10	9	7	5	3	0

Current Ratio (maximum score: 10): This ratio helps in measuring a company's liquidity position. A higher current ratio may benefit the creditors, but an extremely high ratio may adversely impact the company's profitability. The distribution of score for various levels of the current ratio is indicated in Table 3.5.

Table 3.5

Current ratio	*1.50 or more*	*1.30 < 1.50*	*1.15 to < 1.30*	*1.0 to <1.15*	*<1.0*
Score	10	8	6	3	0

Return on Capital Investment (maximum score: 10): [profit before interest and tax ÷ capital investment] The percentage of return on the capital investment is a good indicator of a company's earning capacity. Any company registering returns on its capital investment that are lower than the cost of the capital is undesirable. The score distribution covering various returns in percentage terms is given in Table 3.6.

Table 3.6

Return on capital investment	*>20%*	*17 to 20%*	*14 to < 17%*	*12 to < 14%*	*10 to < 12%*	*<10%*
Score	10	8	6	4	2	0

Debt-Service Coverage Ratio (DSCR) (maximum score: 10): [net profit + depreciation + interest on term loan ÷ annual repayment of term loan + interest on term loan] This ratio measures the company's capacity to service its debt, that is, repay the term liabilities and interest thereon. The score to be allotted for ratios at various levels is given in Table 3.7.

Table 3.7

DSCR	*>2.0*	*1.8 to 2.0*	*1.6 to < 1.8*	*1.2 to < 1.6*	*1.0 to < 1.3*	*<1.0*
Score	10	9	7	5	3	0

Debt-Equity Ratio (maximum score: 10): [total debts ÷ tangible net worth] This ratio is an indicator of the promoters'/shareholders' stake in the business as against the total debt. A lower debt-equity ratio means high- or long-term stability in case the ratio is on a gradual downturn, as shown in Table 3.8.

Table 3.8

Debt- equity ratio	*Up to 1.0*	*>1.0 to 1.5*	*>1.50 to 2.0*	*>2.0 to 2.50*	*>2.50 to 3.0*	*>3.0*
Score	10	9	7	5	3	0

Cash Flow Position: Banks should obtain the borrowing company's cash flow statement to ascertain its capacity to generate the requisite profit and surplus funds for repayment of the term loan instalments and for meeting the capital expenditure, as envisaged in the agreed projections submitted at the outset for the bank's approval. The various situations and scores to be allotted would be as indicated in Table 3.9.

Table 3.9

Future cash flows	*Company would have enough profit and surplus funds*	*Company would have enough profit and surplus funds*	*Company would have enough profit and surplus funds*	*Company may not have enough profit to meet its loan*

	to meet its obligations including payment default. instalments	*after taking into account the loans already sanctioned, of interest and loan shortly.*	*after taking into account only the to be released sanctioned/released.*	*repayments obligations and may applied for, which are yet to be*
Score	10	7	4	0

Conduct of Bank Accounts and Availability of Collaterals (maximum score: 45)

The conduct of bank accounts with banks/FIs is to be evaluated in the context of regularity in accounts, which may depend on timely payments of interest and instalments of the loans (see Table 3.10). In addition, the conduct of accounts can be gauged from the compliance of terms/conditions related to the loan (see Table 3.11), timely submission of data/information to the bank (see Table 3.12), and securities offered by the borrower to secure bank loans (see Table 3.13). The parameters and scores allotted to them are given below.

Conduct of Bank Accounts (regular/irregular) (maximum score: 10)

Table 3.10

Accounts running regular and their conduct satisfactory	*Accounts remained irregular for 15 days*	*Accounts remained irregular for 16-30 days*	*Accounts remained irregular for 31-45 days*	*Accounts remained irregular for more than 45 days*
Score 10	8	6	3	0

Compliance of Terms and Conditions of Sanction (maximum score: 5)

Table 3.11

All conditions complied with	*Conditions related to security creation complied with while others still remain to be complied with*	*Conditions of security creation yet to be complied with, while other conditions complied with*	*Conditions not complied with*
Score 5	4	2	0

Discipline in Timely Submission of Financial Data/Stock Statements (maximum score: 5)

Table 3.12

Timely submission	*Delayed submission up to 15 days*	*Delayed submission 16 – 30 days*	*Delayed submission 31 – 45 days*	*Delayed submission more than 45 days*
Score 5	4	3	2	0

Security of Coverage (primary and collateral) (maximum score: 10)

Table 3.13

Percentage to total sanctioned limits, both fund and non-fund based	*>200%*	*175 to 200%*	*150 to <175%*	*125 to <150%*	*100 to <125%*	*<100%*
Score	10	8	6	4	2	0

Other aspects related to the conduct of bank accounts may include operations in non-fund based limits and the diversion of funds.

Operations in Non-Fund Based Loan Limits (maximum score: 5): Non-fund based loan limits generally include the letter of guarantee and the letter of credit limits. These are called non-fund based limits as these do not involve extending any funds or money. These, however, involve commitment by banks on behalf of their customers to pay in the event of default by the customers. The various situations and scores allotted under each situation are given in Table 3.14.

Table 3.14

Operations in non-fund based loan limits	*Borrower generally his commitment and arranges funds whenever L/G or L/C liability falls due liabilities*	*Borrower honours Borrower generally arranges funds whenever liabilities devolve or takes maximum 15 days in meeting his 30 days.*	*Borrower generally delays in arranging the funds whenever the liabilities devolve The period of delay goes up to exceeds 30 days.*	*delays in arranging the funds whenever non-fund based limits devolve. The delay generally*
Score	5	4	2	0

Diversion of Funds (maximum score: 10): Banks take a serious view whenever they observe that the borrowers are diverting funds to their allied and associated concerns, particularly when they themselves are not doing well. Such diversion may affect the company's liquidity and operations. This parameter is important, and the scores allotted for the various types of situations are given in Table 3.15.

Table 3.15

Diversion of funds	*Company is not diverting any funds*	*Company has diverted funds, maybe from short terms to long terms, to be utilized in the company itself to meet emergent*	*Company has diverted funds to its allied/ associate concerns by maintaining CR and DER within bank's*	*Company has diverted funds to its allied/ associate concerns and for repayment of unsecured loans by affecting its*

		norms	*acceptable norms*	*CR and/or DER beyond norms acceptable to banks*
Score	10	7	4	0

Industry/Business Outlook (maximum score: 10): The future outlook of any unit can be gauged from certain parameters such as the expected growth rate and the intensity of competition from existing/new entrants in the field as also from any threat from substitutes, the technology used and the threat of its obsolescence, the general outlook based on capital market perceptions, etc. The scores allotted for these parameters are given below.

Growth Rate (maximum score: 10): The growth in terms of percentage during the previous two years appears as shown in Table 3.16.

Table 3.16

>20%	*15-20%*	*10-<15%*	*5-<10%*	*<5%*	*Decline*
Score 10	8	7	5	3	0

Threat of Competition (maximum score: 10): The threat from existing and new entrants as also substitutes could be rated as indicated in Table 3.17.

Table 3.17

Minimum threat	*Modest threat*	*Marginal threat*	*High threat*	*Very high threat*
Score 10	8	5	2	0

Reliability of Technology (maximum score: 10): The threat from obsolete technology could be rated as shown in Table 3.18.

Table 3.18

Minimum threat	*Modest threat*	*Marginal threat*	*High threat*	*Very high threat*
Score 10	8	5	2	0

Industry Outlook (maximum score: 10): A general outlook of industry, based on a study of the market as also a perception of the capital market, could be rated as shown in Table 3.19.

Table 3.19

Bright outlook	*Good outlook*	*Average outlook*	*Below Average outlook*	*Dismal outlook*
Score 10	8	6	3	0

Promoters/Management (maximum score: 35)

The single most important reason for the deterioration of healthy businesses into sick companies has been inefficient management and their lack of integrity and commitment. This therefore makes the evaluation of management a necessary exercise despite the fact that the rating of management is always difficult as most of the parameters available for this purpose are generally qualitative in nature and difficult to quantify for the purpose of assigning scores/ratings. The various parameters, how these are to be evaluated, and the scores allotted are discussed below.

Integrity/Commitment would be reflected in:

- market and banker's report;
- willingness to offer securities for the bank loan;
- willingness to increase the stake in the business;
- commitment towards business and taking steps for faster implementation of the project; and
- established track record in honouring commitments.

Financial Strength/Risk-bearing Capacity and Technical Knowledge: The parameters are:

- promoter's financial position (net worth);
- position with regard to availability of funds/liquid assets;
- means of financing and the stake in the business;
- promoter's technical/financial qualifications/experience;
- knowledge of product(s) and process of manufacture;
- knowledge of financial/banking-related aspects; and
- support from group companies.

Organizational Structure and Succession Plan: This to be examined in relation to:

- type of organizational structure and hierarchy;
- qualifications/experience of persons holding key positions;
- employee turnover in the organization;
- coordination between the various executives/departments;
- position of delegation of powers and responsibilities; and
- succession plan for 'top management'.

Market Reputation and Past Track Record: This should be examined in the light of:

- market dealings and reputation;
- price of the shares and earnings per share;
- market capitalization and volume of stocks traded; and

- history of payment of dividends/bonus issues.

The scores allotted to each of the abovementioned parameters are listed in Tables 3.20, 3.21, 3.22, and 3.23.

Management Integrity/Commitment and Financial Strength (maximum score: 20)

Table 3.20

Parameter and rating	*Maximum score*	*Of high order*	*Good*	*Satisfactory*	*Marginal*	*Unsatisfactory*
Integrity/commitment	5	5	4	3	2	0
Financial strength/technical knowledge and risk-bearing capacity	5		5	4	3	2 0
Organizational structure and succession plan	5	5	4	3	2	0
Market reputation and past track record	5	5	4	3	2	0

Management of Inventory and Receivables in Relation to Net Sales per Month (maximum score: 5):

This measure [average inventory + receivables ÷ net sales per month] indicates the degree of efficiency in the management of inventory and receivables. The shorter the period, the more efficient is the management.

Table 3.21

Ratio value score	*Maximum*	*<3 months*	*3 to <4 months*	*4 to <5 months*	*5 to <6 and above*	*6 month*
	5	5	4	3	2	0

Realizability of Receivables and Valuation of Inventory (maximum score: 5)

Table 3.22

Realizability of receivables and valuation of inventory	*Maximum score*	*Comments given by bank's inspectors/stock auditors satisfactory*	*Comments given raised doubts but no shortfall in value indicated*	*Comments given indicate nominal shortfall in value, say, maximum up to 5%*	*Comments given are adverse, indicating poor quality of receivables/inventory*
Score	5	5	4	2	0

Transparency in Account Statements (maximum score: 5)

Table 3.23

Transparency in accounting statements (related to disclosures by management and auditors)	*Maximum score*	*Standard accounting practices being consistent; management has made disclosures and there are no qualifications from auditors*	*Standard accounting followed which are consistent; made disclosures and auditors have given qualifications that are not damaging*	*Accounts lack transparency as practices being adequate; auditors have given management has that are damaging and may erode company's net worth*
disclosures are not qualifications from qualifications				
Score	5	5	3	0

Summary of Various Parameters

The various parameters and the associated scores are summarized In Table 3.24.

Table 3.24

A. Operational/Financial Performance (maximum score; 80)	
1 Plant capacity utilization	10
2 Current ratio	10
3 Return on capital investment	10
4 Debt-equity ratio	10
5 Debt-service coverage ratio	10
6 Achievement of net sales projections	10
7 Achievement of net profit projections	10
8 Future cash flows	10
B. Conduct of Bank Accounts and Availability of Securities (maximum score: 45)	
1 Accounts running regular/irregular	10
2 Compliance in terms/conditions of sanction	5
3 Discipline in timely submission of data/information	5
4 Primary and collateral securities	10
5 Operations in non-fund based loan limits	5
6 Diversion of funds	10
C. Industry/Business Outlook (maximum score: 40)	
1 Expected growth rate	10
2 Threat of competition from existing and new entrants and substitutes	10
3 Technology development and threat of obsolescence	10
4 General outlook/capital market perception	10
D. Rating and Evaluation of Management (maximum score: 35)	
1 Management integrity/commitment and financial strength	20
2 Management of inventory and receivables in relation to sales	5
3 Realizability of receivables and valuation of inventory	5
4 Transparency in accounting statements	5
Grand Total (A+B+C+D):	**200**

The borrowers are to be rated on the basis of the score received out of 100; but as the total score of all the parameters under A+B+C+D works out to 200, the score received is reduced by 50%..

Risk Categorization of Borrowers

Based on the score achieved by the borrowing units, out of a total score of 100, the grades and risk categories may be allotted to the borrowers as given below. The risk rating of individual borrowers can also help in evaluating/rating the credit portfolio and evolving policies that can help in checking the migration of borrowers from a low-risk category to a high-risk category, as indicated in Table 3.25

Table 3.25.

	Score	*Rating/Grade*	*Risk categorization*	
·	90% or more	AAA	Practically no risk	
·	80–89%	AA	Minimal risk	
·	70–79%	A+	Modest risk	
·	60–69%	A	Marginal risk	
·	50–59%	B+	Medium risk	(Generally borderline/likely NPAs*)
·	40–49%	B	High risk	(Generally sub-standard category of NPAs)
·	30–39%	C	Very high risk	(Generally doubtful category of NPAs)
·	Below 30%	D	Caution	(Generally loss category of NPAs)

*NPA= non-performing asset

The model merits adoption by other financial institutions financing technology transfer projects.

SECTION 3.4 SUMMARY

- Financing risks can be divided into two categories: business-related risks and control-related risks.
- Business-related risks, which are associated with operational activities and the market environment of banks, are of five types: credit risk; market risk; country risk; business environment risk; and operational risk.
- Credit risk is the possibility of losses associated with a diminution in the credit quality of borrowers/counterparties. Losses may arise from outright default due to inability/unwillingness of borrowers/counterparties to meet commitments, as also due to the risk inherent in the nature of business activity and environment in terms of obsolescence of technology/product(s) design, competition, inadequate supply of inputs, lack of infrastructure, etc.
- Market risk arises from an adverse impact on a bank’s earnings/capital caused by a change in market variables. The market risk comprises interest rate risk, foreign exchange risk, equity price risk, commodity price risk, and liquidity risk.

- Interest rate risk may be on account of changes in interest rates, both of assets and liabilities. Foreign exchange risk is caused by the effect of an adverse exchange rate movement on a bank's foreign currency exposure, and includes transaction exposure, translation exposure, and economic exposure. Equity price risk relates to capital market exposures which arise due to an adverse movement in equity prices. Liquidity risk is caused by a mismatch in the maturity of assets and liabilities.
- Country risk arises when a foreign country is unable to repay its debts. It includes currency transfer risk, political risk, cross-border risk, and sovereign risk.

- Business environment risk arises due to the lack of prior planning in the formulation of lending policies relating to the identification of target markets and products/customer base.
- Operational risk is caused by deficient internal processes/systems/procedures, non-conducive work environment, demotivated/untrained/incompetent staff, obsolete/ untested technology, etc. Control-related risks are associated with weaknesses in the control systems of banks due to organizational bottlenecks in the form of inadequate/inappropriate structure.
- The main elements of the RBI credit risk management framework are: credit risk policies and procedures; organizational structure for effective credit administration; and credit rating framework.
- Credit risk is the possibility of losses associated with a diminution in the credit quality of the borrowers/counterparties. Losses may stem from outright default due to inability/unwillingness of a customer/counterparty to meet commitments in relation to lending/settlement/some other financial transaction.
- Banks as well as financial institutions should prepare a comprehensive and well- articulated/written credit policy document, highlighting the strategy, policies, and procedures for effective management of credit and mitigation of credit risks. The main features of the policies/procedures, *inter alia*, should include identification of activities/industries doing well; delegation of approving/sanctioning powers; linking credit risk scoring/rating system and risk acceptance criteria with borrowers' risk rating; laying down prudential exposure limits for loans; discussion of concentration risk/loan review mechanism and renewal systems; evolution of effective systems of monitoring borrowers' operational/financial performance; laying down guidelines on pre-sanction appraisal and monitoring; discussion of Forex risk; fixation of limits for inter-bank exposures; laying down guidelines on multiple credit approval/policies on exposure to high-risk sectors; evolving a consistent approach towards early recognition of problem exposures and remedial action in the mechanism of loan pricing; and creation of an independent set-up for credit risk management and an audit and loan review mechanism in line with RBI guidelines.
- For the successful implementation of effective credit administration and risk management systems, every bank should create a sound organizational structure. The Board of Directors should have overall responsibility for the management of credit and other risks. The Board's Credit Risk Management Committee (CRMC) should be responsible for the implementation of the credit risk policy/strategy

decided upon by the Board of Directors. The Credit Risk Management Department (CRMD) of the CRMC should be independent of the Credit Administration Department (CAD). Banks should also have an independent set-up to perform functions such as risk rating of borrowers, monitoring/review of loan, and credit risk audit.

- Banks as well as financial institutions funding technology projects should evolve a comprehensive risk scoring/rating framework to serve as a single point indicator of borrowers'/counterparties' diverse risk factors. This risk rating structure should serve the following purposes: taking credit decisions; pricing of loans; mitigation of risk; facilitating delegation of loan power; migration of credit; management of credit risk; and identification of thrust areas.
- A well-structured credit rating framework should be developed by using a number of operational parameters, financial ratios, collaterals, qualitative aspects of management, and industry characteristics. The scores allotted to each parameter may depend upon their risk-predicting capacity. The model (used by banks) merits adoption by financial institutions funding technology transfer projects.
- The risk rating framework for larger, medium, and small enterprises may vary. Normally, it should have nine grades of which the first five may represent acceptable credit while the remaining four may represent unacceptable credit. It should have some minimum cut-off score below which no credit proposal should be entertained.
- The rating exercise should be undertaken normally at quarterly intervals, or at least on a half-yearly basis, to assess the migration in credit quality.
- Banks should put in place a risk-based internal audit system. They should determine the scope of such audit for low-, medium-, high-, and extremely high-risk areas. The minimum coverage of the audit report should, *inter alia*, include reliability of process of identification/management of various risk areas; plugging of gaps in the control mechanism; verification of compliance of policies/procedures; examination of effectiveness of control system; assessment of integrity/reliability of data and its timely preparation; confirmation of the position of budgetary controls/performance reviews; verification of asset-related transactions; monitoring compliances with risk-based internal audit reports; etc.
- The parameters used by banks in designing a scoring/rating system fall into four broad categories: the unit's operational/financial performance; bank accounts and securities available; business/industry outlook; and promoters/management.
- The important parameters generally used by banks under the head of operational/financial performance include plant capacity; break-even point; sales/profit trend/projections; profit margin; return on capital employed (ROCE); debt-equity ratio (D/E ratio) and debt-service coverage ratio (DSCR); ratio of sales to working capital/assets; inventory turnover; average collection/payment period; etc.
- The important parameters relevant to bank accounts and securities available are: regularity in the conduct of accounts; compliance with the terms of the loan sanction; annual review/renewal of the loan facility; submission of data; nature/volume of the security; validity of the charge;

transparency/disclosure in accounts; diversion of funds; unauthorized withdrawal of funds; utilization of loans; auditors' comment on the quality/valuation of assets; etc.

- The business and industry outlook would be reflected in factors such as competition; technology; market demand and growth potential; quality of products; exports potential; import barriers; foreign exchange component; and volatility of product prices.
- The major components of assessment of promoters/management are the unit's ownership pattern; qualifications; integrity/commitment/sincerity; market reputation/credibility; financial strength; functioning/support of other group companies; turnover of top management; succession plan; etc.

CHAPTER 4. CONCLUDING OBSERVATIONS AND RECOMMENDATIONS

The objective of this concluding chapter is to enumerate major observations arrived at from the study of loans for technology transfer projects, and to suggest recommendations to financial institutions/banks in conducting their loan transactions so that they can better assess and manage their financing risk.

1. Financial institutions and banks should conduct a thorough scrutiny of any technology transfer project submitted to them for financing. Only a rigorous study of the project will establish whether or not it is technically feasible, economically viable, commercially profitable, and financially sound. Apart from these fundamental financial requirements, the project also needs to be examined from the perspective of environmental viability. The funding institutions should prescribe a basic level of standards or critical parameters beyond which no loan proposal for financing a technology project should be entertained

2. A comprehensive, thorough, and sound financial appraisal of technology transfer projects is imperative as such a procedure acts as a built-in mechanism to mitigate risk for funding institutions. Such a system ensures that funding institutions finance commercially profitable and financially sound projects. As a result, the funding/ financing institutions are able to recover the funds loaned, as agreed; in operational terms, this means a low probability of default on the part of borrowing units.

3. It may be difficult for funding institutions to pay the same degree of attention to all loan accounts related to technology transfer projects due to the large volume of work entailed. Projects/borrowers who fall under a high-risk rating can be closely monitored, that is, they should be monitored more frequently than the low-risk projects/borrowers. It is equally important to evolve effective and robust policies and procedures in respect of technology transfer projects of small and medium enterprises vis-à-vis, large enterprises/corporations.

4. For the successful implementation of effective risk management systems, a sound organizational structure should be created by financial institutions/banks. The Board of Directors should have the overall responsibility, *inter alia*, for the management of risk involved in funding technology transfer projects. The Board's Credit Risk Management Committee (CRMC) can be assigned the task of implementing the policies framed by the Board of Directors in this regard and should be accountable for lapses. It should have an independent set-up to perform functions such as borrowers' risk rating, monitoring/review of loan, and credit risk audit.

5. It is recommended that financial institutions funding technology projects should evolve a comprehensive risk scoring/rating framework to serve as a single point indicator of diverse risk factors of small and medium enterprises seeking loans for technology transfer projects. Such a framework should be

developed by using a number of operational parameters. The selective list includes financial ratios, collaterals, and qualitative aspects of management and of industry, with several sub-heads under each of these four broad parameters.

6. The various parameters as well as their sub-heads and the associated scores (covered in chapter 3) are listed in Table 4.1.

Table 4.1

A. Operational/Functional Performance (maximum score80)	
1 Plant capacity utilization	10
2 Current ratio	10
3 Return on capital investment	10
4 Debt-equity ratio	10
5 Debt-service coverage ratio	10
6 Achievement of net sales projections	10
7 Achievement of net profit projections	10
8 Future cash flows	10
B. Conduct of Bank Accounts and Availability of Securities (maximum score: 45)	
1 Accounts running regular/irregular	10
2 Compliance in terms/conditions of sanction	5
3 Discipline in timely submission of data/information	5
4 Primary and collateral securities	10
5 Operations in non-fund based loan limits	5
6 Diversion of funds	10
C. Industry/Business Outlook (maximum score: 40)	
1 Expected growth rate	10
2 Threat of competition from existing and new entrants and substitutes	10
3 Technology development and threat of obsolescence	10
4 General outlook/capital market perception	10
D. Rating and Evaluation of Management (maximum score: 35)	
1 Management integrity/commitment and financial strength	20
2 Management of inventory and receivables in relation to sales	5
3 Realizability of receivables and valuation of inventory	5
4 Transparency in accounting statements	5
Grand Total (A+B+C+D):	**200**

As the borrowers are to be rated on the basis of the score they achieve out of a total of 100, the score received is reduced to 50%, as the total score of all the parameters under A+B+C+D works out to 200.

7. The score achieved by borrowing units, out of a total score of 100, forms the basis for the allotment of their **grades and risk categories** (described in chapter 3), as given in Table 4.2.

Table 4.2

Score	*Rating/Grade*	*Risk Categorization*
· 90% or more	AAA	Practically no risk
· 80–89%	AA	Minimal risk

·	70–79%	A+	Modest risk	
·	60–69%	A	Marginal risk	
·	50–59%	B+	Medium risk	(Generally border line/likely NPAs)
·	40–49%	B	High risk	(Generally sub-standard category of NPAs)
·	30–39%	C	Very high risk	(Generally doubtful category of NPAs)
·	Below 30%	D	Caution	(Generally loss category of NPAs)

* NPA = non-performing asset

These risk categories can also be helpful in the pricing of loans for technology projects. The low-risk project can be charged a lower rate of interest; higher interest rates can be charged for more risky projects. The model (extensively used by banks in India) merits adoption by other funding institutions financing technology transfer projects in the Asia-Pacific Region.

8. In sum, financial institutions and banks should manage the risk of financing technology projects by following (i) the practice of comprehensive project appraisal, and (ii) robust and rigorous procedures in financing the technology projects in terms of close scrutiny of the project's details; incorporation of affirmative and negative covenants in the loan agreement; proper documentation; timely disbursement of the loan; monitoring in respect of utilization of the loan; creation of legal charge on securities; and registration of charges. The adoption of a sound conceptual framework (provided in chapter 2, as widely used in India) by funding institutions in the Asia-Pacific region would be greatly beneficial in minimizing their risk in financing new technology projects.