

Strategic Management and Real Options

- 전략적 경영과 실물 옵션 -

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Abstract

This paper reviews differences between the traditional investment evaluation methods and real option approaches. This study considers management flexibility, contingency and volatility from a strategic management perspective. The roles of various real option approaches are discussed.

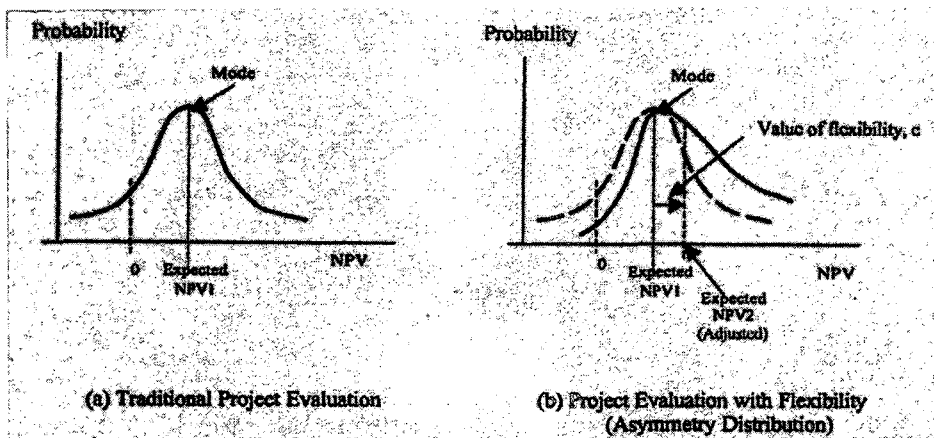
1. Introduction

1.1 Business Environment [7]

- Flexibility
- Contingency
- Volatility

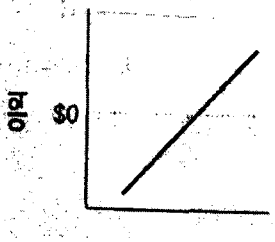
1.2 Uncertainty and Decision Making

1.2.1 Uncertainty [6]

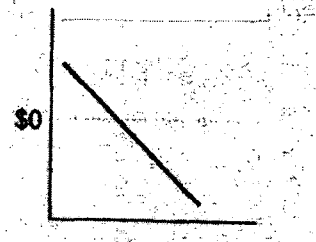


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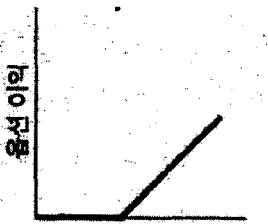
1.2.2 Decision Making [1]



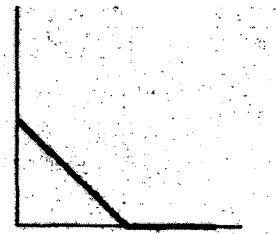
Long Position 가치



Short Position



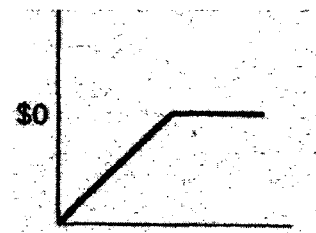
Call Option : Buy 가치



Put Option : Buy



Call Option : Sell



Put Option : Sell

1.3 Strategic Management [1][7]

- 비전 수립
- 위치분석 : 3C(Customer, Company, Competitor)
- 역량분석 : 바람직한 역량 - 현재의 역량 = 역량차이
- 투자전략수립 : 역량 차이를 고려한 시나리오 도출
- 가치를 극대화할 수 있는 최적의 투자전략 선택 : 실물옵션 접근법

2. Investment Evaluation Methods

2.1 Evaluation Methodologies [2][5]

- Financial Approach : Payback Period
 - Internal Rate of Return(IRR)
 - Net Present Value(NPV)
 - Accounting Rate of Return(ARR)
- Multi-Criteria Approach : Information Economics
 - SIESTA(Strategic Investment Evaluation and Selection Tool Amsterdam)
- Ratio Approach : Return On Management
 - IT Assessment
- Portfolio Approach : Bedell's Method
 - Investment Portfolio
 - Investment Mapping

2.2 Appraisal Techniques [4]

- Economic Approaches : Payback Period Technique
 - Return on Investment(ROI)
 - Benefit/Cost Analysis
 - Net Present Value(NPV)
 - Internal Rate of Return(IRR)
 - Equivalent Uniform Annual Value(EUAV)
- Analytic Approaches : Non-Numeric
 - Scoring Models
 - Computer Based Techniques
 - Risk Analysis
 - Value Analysis
 - Analytic Hierarchy Process
 - Expert Systems
- Strategic Approaches : Technical Importance
 - Competitive Advantage
 - Research and Development
 - Management Commitment
 - Look Long Term
 - Emphasis on Intangibles
 - Business Strategy First
- Integrated Approaches : Multi-Attribute Utility Theory
 - Scenario Planning and Screening
 - Information Economics

3. A Real Option Approach to Investment Evaluation

3.1 Real Option [7][8]

- Deferral Option
- Option To Abandon
- Option To Alter Investment Scale
- Switching Options
- Options on Options, Compound Options
- Rainbow Option
- Growth Option
- Time-To-Build Option
- Option To Contract

3.2 Real Option Model [1]

- Partial Derivative Equations : Black Scholes Model
- Dynamic Programming : Binary Tree Model
- Simulation : Monte-Carlo, Bootstrapping

3.3 Real Option Variables [7][8]

- S : 기대 현금 흐름의 현재가치, Present Value of a Project's Operating Assets to Be Acquired (+) : Stock Price, Underlying
- X : 투자비용의 현재 가치, Expenditure Required to Acquire the Project Assets (-)
: Exercise Price, 옵션행사가격
- T : 경쟁우위 유지기간 Length of Time the Decision May Be Deferred (+) : Time to Expiration, 옵션만기
- r_f : Time Value of Money (+) : Risk-Free Rate of Return, 무위험 이자율
- σ^2 : 기대 현금 흐름의 변동가능성, Riskness of the Project Assets (+) : Variance of Returns on Stock, 변동성
- D : 옵션 보유기간 동안의 기회손실 (-) : Dividend, 배당금
- Underlying : Price Contemplation (Discrete : Binary Tree, Continuous : Black Sholes)
: Price Development(Continuous : Diffusion(Brown : Black Sholes), Jump, Mean-Reverting, Discrete : Lattice, Binomial, Trinomial, Additive Binomial)
: The Underlying Is Not Traded(Spanning, Hotelling)
- Risk : Underlying Volatility(Future, Implicit, Seasonal, Forecast, Historical)
: Nature of Volatility(Known : Equalibrium, Duplicated Portfolio, Unknown)
; Unsystematic, Systematic Risk
; Deterministic, Stochastic

- Dividend : Cash Flow(Unknown, Known : Discrete(Once, Multiple), Continuous, Stochastic)
 - : Timing of Payment(Unknown, Known)
 - : Payment(To the Holder of the Option or The Underlying)
- Exercise Price : Amount(Stochastic, Deterministic : Constant, Time-Influenced)
- Riskless Interest Rate : Known, Unknown, Stochastic
- Expiration Date : Known, Unknown

4. Discussions [3]

- Manufacturing Flexibility from an IE Perspective + Flexibility Perspective Based on Real Options
- Type of Flexibility : Machine, Material Handling System
 - Operation ; Process, Product, Routing
 - Volume ; Program, Production, Market

5. References

- [1] Amram, M. and Kulatilaka, N., Real Options, Harvard Business School Press Through KCC, Seoul, 1999.
- [2] Apostolopoulos, T.K. and Pramataris, K.C., "Information and Technology Investment Evaluation : Investments in Telecommunication Infrastructure", International Journal of Information Management, Vol 17, No 4, PP 287-296, 1997.
- [3] Bengtsson, J., "Manufacturing Flexibility and Real Options : A Review", Int. J. Production Economics, 74, PP 213-224, 2001.
- [4] Irani, Z., Sharif, A., Love, P.E.D. and Kahraman, C., "Applying Concepts of Fuzzy Cognitive Mapping To Model : The IT/IS Investment Evaluation Process", Int. J. Production Economics, 75, PP 199-211, 2002.
- [5] Rendkema, T.J.W. and Berghout, E.W., "Methodologies for Information Systems Investment Evaluation at the Proposal Stage : A Comparative Review", Information and Software Technology, 39, PP 1-13, 1997.
- [6] Yeo, K.T. and Qiu F., "The Value of Management Flexibility - A Real Option Approach to Investment Evaluation", International Journal of Project Management, 21, PP 243-250, 2003.
- [7] 손석륜, "이항격자 모델을 이용한 기업가치 평가 : 사례연구", 한국과학기술원 석사학위논문, 2001.
- [8] 이재한, "Real Options을 이용한 투자시기 결정모형", 한국과학기술원 석사학위논문, 2000.