



# Competitiveness Evaluation of International Contractors Based on Back Propagation Neural Network

—A Strategic Analysis of Chinese Construction Firms

Yi-Hsin Lin

Ph.D. Associate Professor

2015 FIG@ Bulgaria, <sup>1</sup>Sofia

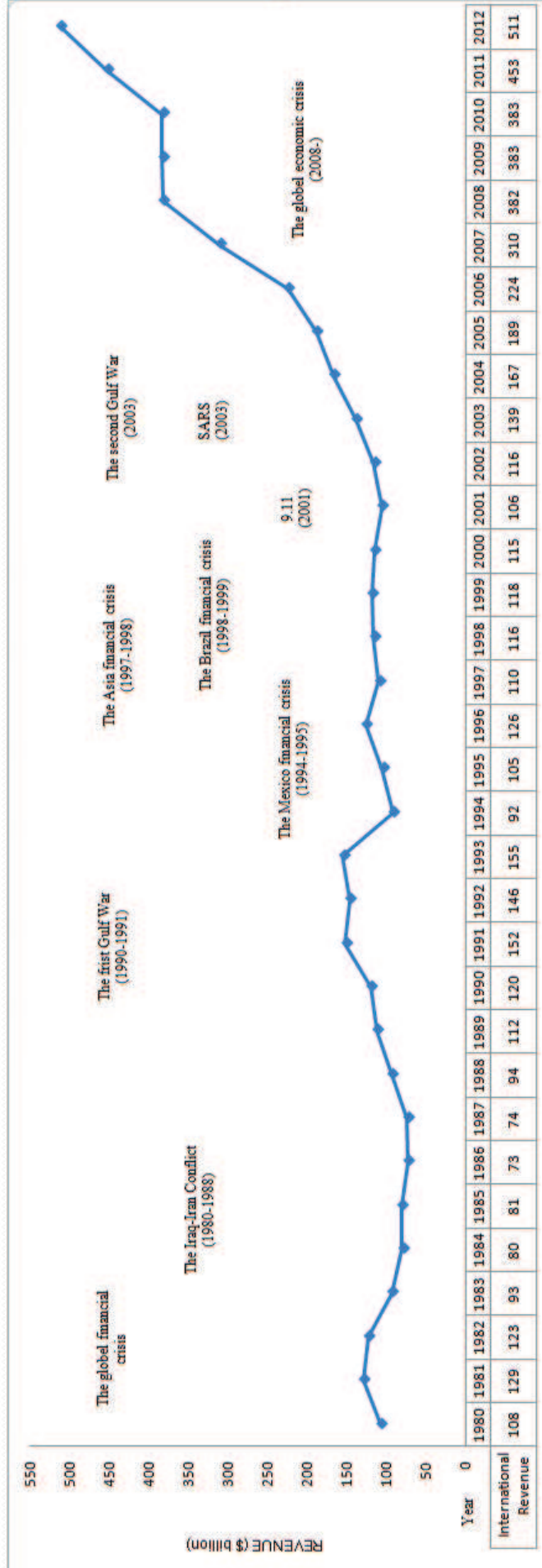


# Outline

1. Introduction
2. Literature Review
3. The Model of the Competitiveness Evaluation of International Contractors
4. Back Propagation Neural Network
5. Conclusions

# Introduction

- The International Revenues of Top International Contractors, 1990-2012



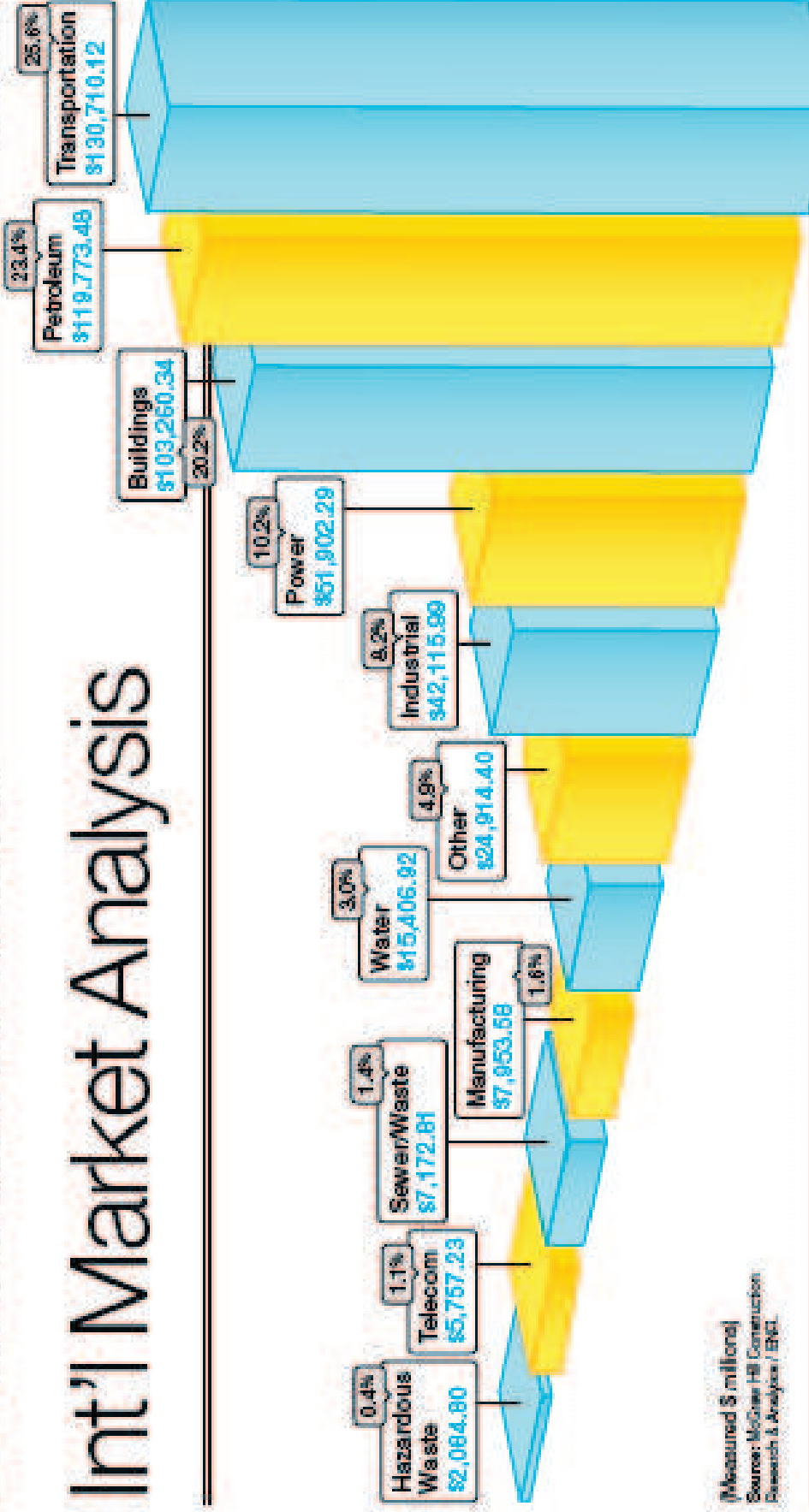
# Introduction

**ENR**

THE TOP 250 INTERNATIONAL CONTRACTORS

OVERVIEW

## Int'l Market Analysis



(Measured \$ millions)  
Source: McGraw Hill Construction  
Research & Analytics / ENR

The Top 250 List

RANK 2013	2012 FIRM	2012 REVENUE \$ MIL		2012 NEW INT'L CONTRACTS \$ MIL	GENERAL BUILDING	MANUFACTURING	POWER	WATER SUPPLY	SEWER / WASTE	INDUS. / PETROLEUM	TRANSPORTATION	HAZARDOUS WASTE	TELECOM
		INT'L	TOTAL										
1	2 GRUPO ACS, Madrid, Spain†	42,772.0	50,654.6	43,658.8	27	1	8	4	3	11	25	1	3
2	1 HOCHTIEF AG, Essen, Germany†	34,563.3	36,452.7	37,673.0	32	2	2	4	3	9	21	1	4
3	5 BECHTEL, San Francisco, Calif., U.S.A.†	23,255.0	29,436.0	12,926.0	0	0	0	0	0	71	29	0	0
4	3 VINCI, Rueil-Malmaison, France†	18,419.5	50,338.7	18,854.3	13	0	12	2	0	8	50	1	5
5	7 FLUOR CORP., Irving, Texas, U.S.A.†	17,209.6	22,352.8	20,600.0	12	1	1	0	0	76	10	0	0
6	4 STRABAG SE, Vienna, Austria†	16,062.0	18,557.0	15,271.0	34	0	0	4	3	7	51	0	0
7	8 BOUYGUES, Paris, France†	14,196.0	33,885.0	14,538.0	29	0	3	1	1	3	60	1	0
8	6 SAIPEM, San Donato Milanese, Italy†	13,770.7	14,039.1	NA	0	0	0	0	0	96	2	0	0
9	9 SKANSKA AB, Solna, Sweden†	13,291.6	17,217.0	14,006.3	16	4	6	2	2	6	29	0	2
10	10 CHINA COMMUNICATIONS CONSTRUCTION GROUP LTD., Beijing, China	11,187.2	47,327.3	20,310.8	2	0	1	1	2	4	91	0	0



# Introduction

- As Chinese contractors explore in developed countries like the United States, they must face fierce competition from the top international contractors.

# Introduction

Construct an evaluation index system for the competitiveness of international contractors



Adopt Analytic Hierarchy Process (AHP) to calculate the weighted competitiveness index



Build an evaluation model based on Back Propagation Neural Network to test the competitiveness of the proposed model

# Literature Review

- Three major mainstream schools for enterprise competitiveness

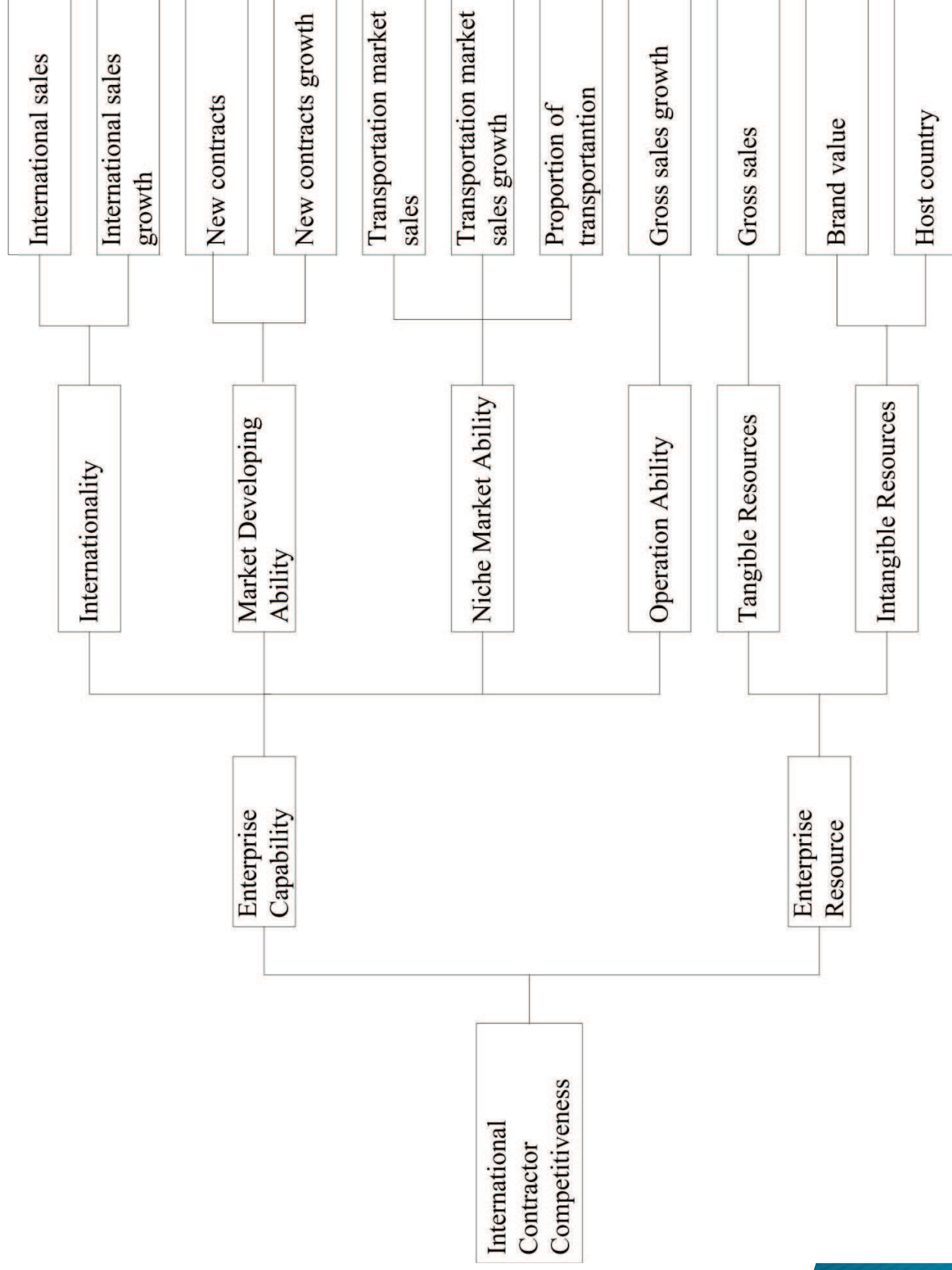
Wernerfelt  
Resources  
School

Porter  
Market  
Structure  
School

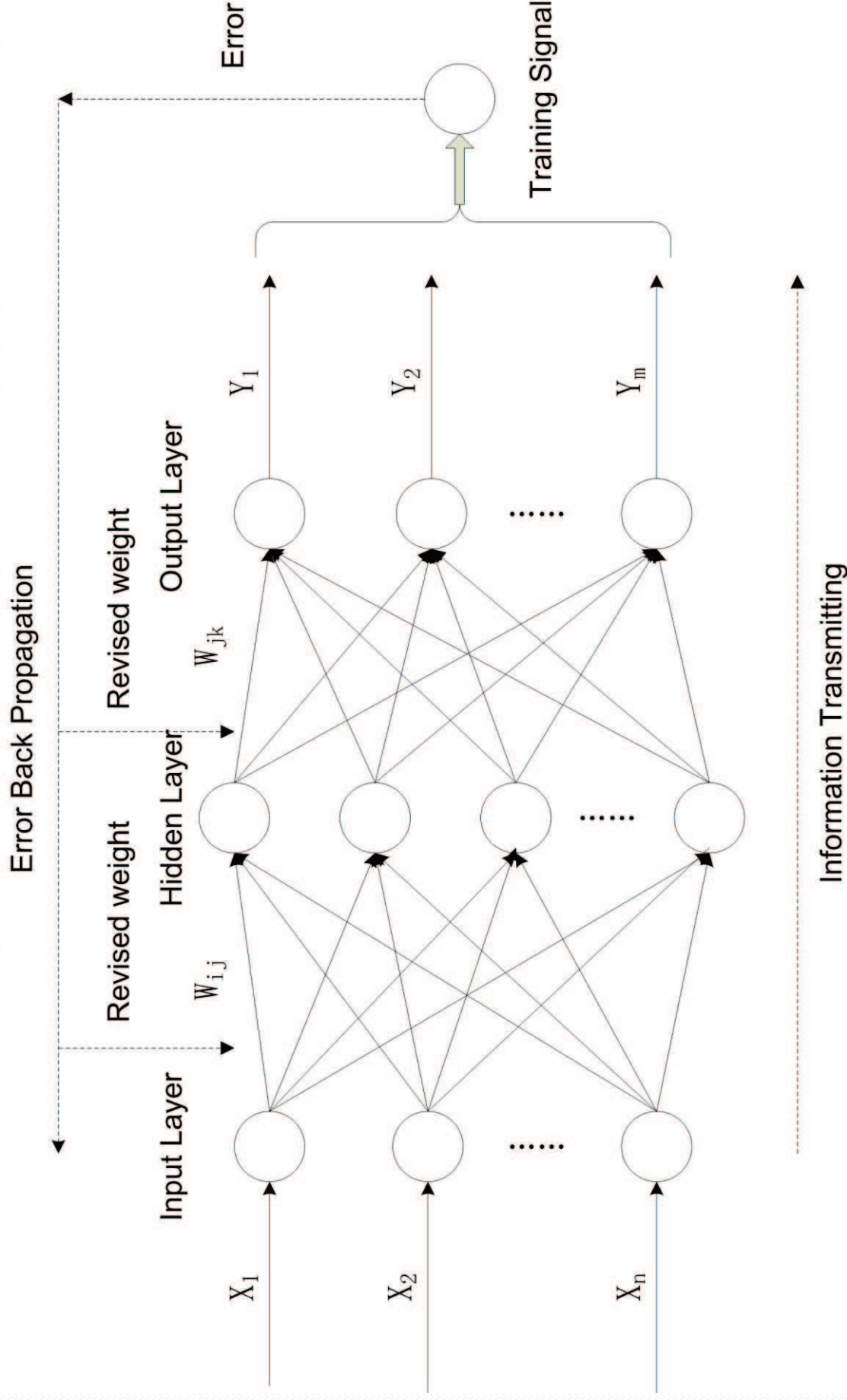
Prahalad & Hamel  
Ability  
School



# The Components of Contractor's competitiveness



# BP Neural Network Model



# BP Algorithm

