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Mobile trading experiences and the endogenous trading signal system

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An important topic of financial and investment service provider is how to offer clients more attractive services to increase their psychological switching costs. Mobile trading services bring investors freedom from site restrictions, which may have impact on their trading behaviors and judgment patterns. This study employs expert knowledge analysis to explore whether there is any difference between investors with experience using MTS (mobile trading systems) (Type I) and investors without such experience (Type II) in terms of individual trading signal systems when buying/selling stocks. The research findings suggest that the two types of investors differ significantly in trading signal judgment patterns. Type I investors attach greater importance to information integration and performance of individual stocks relative to the general market; whereas, Type II investors are in favor of analysis of insider share holdings and the general performance of the industry for the composition method of decision-making. With regards to factorial relationships that affect the overall decision-making judgment of the two types of investors, the trading judgments of Type I investors are centered on the cross-analysis of information with share hold changes as the key factor of investment signals. The trading judgments of Type II investors are mainly centered on the cross-analysis of share ownership changes, taking advantage of share hold changes as the overall judgment basis, which is a rather simple method of forming a trading signal judgment system. Financial and investment service providers may use the findings of this study to adjust the content of mobile trading programs in order to create better benefits.

Key words: Mobile trading, e-banking, financial marketing, trading signal, investors' behavior.

RESEARCH BACKGROUND AND MOTIVES

In the financial service industry, under the industrial characteristic of high regulation compliance, competitors sell financial products and services of high regulation compliance demands, which lead to relatively short intervals of competitive advantage as successful operating patterns will soon be copied.

Ehrlich (2004) suggested that a considerably important topic in financial service industries concerns providing clients with more attractive services that would develop their trading needs, which in turn, would increase their psychological switching costs. Banking and investment firms attempt to develop and adopt a variety of strategies of innovative service modes to strengthen their competitive edges. Kim et al. (2009) and Gu et al. (2009) argued that mobile banking services can be regarded as a newly emerging mobile commercial application, owing to the characteristics of no site restrictions, high convenience

and high interactivity. In recent years, mobile banking services have attracted the attention of banking, investment service providers and consumers.

Mobile banking and investment services are approaches that create client identity by service advantages. At present, the trading volume conducted through electronic systems by investors in stock markets accounts for about 70% in Korea, 35% in the US and 25% in Japan of the total stock market turnover and continues to show a fast growing trend. In response to market developmental trends, investment service providers are bound to invest more energy and resources in information technology-assisted financial product transaction technologies and management. Shih (2009) analyzed the assessment elements of the four trading patterns of investors including "conventional telephone order submissions", "voicemail order submissions", "access point (AP) soft-

ware order submissions," and "mobile trading systems (MTS) trading".

The research results suggested that investors cared more about site benefits and information system risks, while relatively neglecting performance risks when using a MTS order submission platform in comparison with the other three trading patterns. Investors using the innovative mobile trading system (MTS) seem to differ considerably, in terms of trading behaviors and cognitive patterns, from the conventional investors who attach great importance to information accuracy and timeliness. According to past researches, investors used fundamental parameters {(Lewellen, 2004; Edirisinghe, and Zhang (2008); Yu and Kim, 2009; Simlai, Pradosh (2009)}, corporate governance parameters (Wang et al., 2008; Jackson et al., 2008; Bokpin and Isshaq, 2009), technical parameters (Lo et al., 2000; Dawson and Steeley, 2003; Schulmeister, 2009; Marshall et al., 2009) and informational parameters (Asquith et al.,2005; Holland, John, 2006; Chiao et al., 2009) to construct buying/selling stock signal systems.

Tenner (2004) suggested technology may remake humanity and discussed the impact of the development and use of innovative science and technology products on human behavior and customs. The innovation and development of mobile science and technology brings investors freedom from site restrictions, and provides them with convenient trading information channels. However, whether the use of such scientific and technological services will have any impact on investors' trading behaviors and judgment patterns is the focus of this study, which analyzes whether there are any differences between investors with experience using MTS order submission platforms and investors without such experience, in terms of indicators of concern in the construction of buying/selling stock trading signal systems. In addition, this study discusses the characteristics of the trading signal judgment systems of the two types of investors. The research findings can serve as reference to financial investment service providers in the analysis of client behavior, the establishment of suitable operations, and developing marketing strategies.

TRADING SIGNAL JUDGMENT SYSTEM

Investors collect factors that affect stock prices as indicators for the construct of individual trading signal judgment systems. The investors' strategies of buying and selling stock are reflected in stock prices, and thus, affect the value of the stocks. By summarizing the results of past investment-related studies, it is found that individual investors use fundamental parameters, technical parameters, news, and industrial informational parameters as the main basis for the construction of their trading signal judgment system. This study summarizes past fundamental information related to stock issuing companies and the general economy, and technical analysis and information aspect-related research findings as the major perspectives in the construction of trading signal judgment systems, and discusses the above mentioned three perspectives, as follows:

Fundamental parameters

Fundamental concepts of stock selection strategies are often discussed from four aspects, including general economy and industrial overview, financial indicators, corporate governance, and linkage to international stock markets. First, with respect to the overall economic and industrial overview, Kwon and Shin (1999) proposed a co-integrated relationship between the Korean stock market and the overall economic variables. Compared with Japan and the US, the South Korean stock market is more sensitive towards exchange rate variables, as South Korea is a foreign-trade oriented economy.

Caporale et al. (2002) indicated that, between 1987 and 2000, stock prices in Japan and South Korea were negatively leading foreign exchange rates, while stock prices in Indonesia and Thailand were positively leading foreign exchange rates. In addition, inflation caused by loose money supply is highly related to stock returns (Fifield et al., 2002; Kim, 2005). Conover et al. (2005) discussed the relativity of the monetary polices of Fed and global stock markets between 1963 and 2001. The research findings suggested that higher excess returns existed when expansionary monetary policies were implemented. However, the market returns were relatively lower when tight monetary policies were in place. Companies with smaller equities are relatively more sensitive to changes of monetary policies.

Regarding discussions from the perspective of financial indicators, Foster (1986) used 12 indicators of 4 perspectives, including liquidity ratio, leverage/capital structure ratio, profitability ratio, and turnover ratio as a financial analysis structure. Bernstein (1988) conducted financial analysis using 25 indicators of 6 perspectives, including the short-term liquidity ratio, cash flow ratio, capital structure and long-term solvency ratio, return on investment, asset use efficiency ratio, and operating performance ratio. Lewellen (2004) found that stock dividends can be used to predict the total revenue of stocks. Edirisinghe and Zhang (2008) proposed the "RFS" index after integrating financial indicators, and confirmed that it could improve the investment portfolio performance of the mean numbers and variance numbers. In cases of long-term and short-term investment portfolios, growth type stocks are profitable, and company size and book-to-market ratio are relatively more important indicators. In addition, some scholars found that volatility will significantly affect the performance of the book-to-market ratio (Simlai, 2009; Yu and Kim, 2009). This study summarizes studies relating to finan-

Table 1. Fundamental aspect factors and related studies.

Researchers	Factors	Conclusions
Mukherji et al. (1997)	Book/price, sales/price ratio, debt/asset	Positively correlated
	Company size	Negatively correlated
	EPS/price,	Insignificantly correlated
Dhatt et al.(1997)	Dividends	Company with higher dividends have higher stock prices
Dechow et al.(2001)	Cash flow/price, EPS/price, book/price	For reference of short sellers
Barber et al.(2003)	Degree of appreciation of company, three-year ROA, five-year growth on sales, expenditure on advertising/sales, market capitalization, book/price	Companies highly appreciated have relatively significant importance
Lewellen(2004)	EPS/price, book/price, dividend yield	Highest dividends yield predictability
Edirisinghe and Zhang (2008)	Science and technology stocks' financial indicators	The stock picking strategy can effectively enhance the returns of investment portfolios.
Yu and Kim (2009)	Growth type stocks' financial indicators	Able to create excess returns of long-term /short-term investment portfolios.
Simlai (2009)	Stock returns, size, book-to-market ratio	Able to create excess returns of investment portfolios

cial indicators, as shown in Table 1.

Regarding corporate governance, in order to avoid losses, companies will have earnings management of higher frequency and degree (Wang et al., 2008). Wei and Varela (2003) identified a negative relationship between the official stock ownership ratio and company value of private companies in China during 1994 to 1996. Klapper and Love (2004) analyzed 495 companies from 25 emerging markets, and their findings suggested that companies from countries with poorer legal systems would have higher corporate governance rating if they were listed in US stock exchanges at the same time. In addition, companies with better corporate governance rating would have better operating performance and market value. The research results are in line with those of Drobetz et al. (2004). Jackson et al. (2008) used companies listed on the Toronto Stock Exchange as samples to conduct empirical studies relating to insider information and found that high-level officials' payments were related to insider trading, which was relatively significant in cases of large companies. In addition, Bokpin and Isshaq (2009) also found that corporate information disclosure mutually affected foreign equity

ownership in cases of companies listed on the Ghana Stock Exchange. Corporate governance related studies are summarized, as shown in Table 2.

Technical parameters (technical analysis)

According to the viewpoint of Fama (1970), efficient market hypothesis, market information would be fully reflected in the stock market in an efficient market. Hence, excessive returns can only be obtained in markets without efficiency by the use of stock picking strategies through technical analysis methods, which can be divided according to characteristics into chart patterns displaying price variations and technical indices of numerical judgments.

Ratner and Leal (1999) tested 10 types of variable-length moving average rules (VMA) in the emerging markets of Latin America and Asia. The study found that, during 1982 to 1995, the average returns of trading according to signals were higher than the returns of the selling signals. Lo et al. (2000) employed 10 technical patterns, including head-and-shoulders, inverse head-

Table 2. Corporate governance-related studies.

Researchers	Factors	Conclusions
Wei and Varel (2003)	Governmental equity ratio, privatized enterprises.	Governmental equity ratio has negative impact on corporate values
Klapper and Love (2004)	Corporate governance, business performance, market value	Companies listed on the US market have higher corporate governance levels. Companies with better corporate governance levels can display better business performance and market values
Drobetz et al. (2004)	Corporate governance commitment, equity, transparency, issues of board of directors, auditing.	Buy companies of higher corporate governance rating and sell companies of lower corporate governance rating to obtain excess returns.
Wang et al. (2008)	Earning management frequency and degree, zero earnings, and prior earnings	Compared with report earning increase, higher earning management frequency and degree can be created when earnings are lowered.
Jackson et al. (2008)	Insider trading, information strategy	The payment of CEO and insider trading has no correlation in cases of large, medium, and small sized companies. The risk of insider trading is from corporate governance.
Bokpin and Isshaq (2009)	Foreign equity, corporate disclosure	Free cash flow and financial leverage are significantly related to foreign equity. Company disclosure and foreign equity are correlated.

and-shoulders, broadening tops, broadening bottoms, triangle tops, triangle bottoms, rectangle tops, rectangle bottoms, double tops and double bottoms to analyze stocks listed on the New York Stock Exchange and NASDAQ during 1992 to 1996, and found that, using five technical patterns, including head-and-shoulders, broadening bottoms, rectangle tops, rectangle bottoms, and double tops in trading can obtain considerable returns. However, these 10 technical patterns can obtain significant returns in the NASDAQ market. Dawson and Steeley (2003) analyzed the British stock market, during 1986 to 2001, by extending the study model of Lo et al.(2000), and obtained similar findings to the research results of Lo et al.(2000), proving that technical patterns were of reference value in the British stock market. Gunasekarage and Power (2001) also found that the moving average line trading method could predict excess returns in four emerging markets, including Bangladesh, India, Pakistan, and Sri Lanka.

Individual investors often use margin trading as a method to expand credit; therefore, margin-trading changes would affect stock picks and operating strategies of investors. Hardouvelis and Peristiani (1992) found that, investors reacted rapidly to Type I stocks when the Japanese stock market credit conditions changed; while their reaction to Type II stocks were relatively weaker and slower. When credit is tightened, trading turnovers, financing, lending, and lending transaction accounts would drop in percentage; and variations of daily stock prices and daily return conditions would increase. In addition, there is a two-way cause and effect relationship between the balance of margin purchases and short sales and changes of stock prices. Bekaert and Harvey (1997), Karolyi (1999), and Wang and Shen (1999) found that, the entry and exit of foreign investments in the stock

market would significantly affect the psychological state of investors. Schulmeister (2009) pointed out that the intraday trading data implied information of follow-up changes to stock prices, and proved that such a method may create abnormal returns. Marshall et al. (2009) found by using the method of Schulmeister (2009) that there was little evidence regarding the profitability of stock markets during 1990 to 2004.

However, in the long run, using the moving average technical trading method would create abnormal returns. Studies relating to the technical aspects are summarized, as shown in Table 3.

Informational aspect

Nofsinger (2001) investigated the impact on the trading behaviors of institutional investors and individual investors of 465 press releases regarding 120 US companies between January 1, 1990 and January 1, 1991. The findings suggested that the nature of news would affect the trading motives of investors. News releases concerning companies would lead to abnormal trading volumes in the stock market. Reports on stock dividends, assets, earnings, and other news would also induce relatively higher trading volumes. With regard to news visibility, compared with individual investors, institutional investors had relatively no response. In addition, the release of good news would result in a change of market returns, amounting to 5.35% on average for three days, as well as positive abnormal trading activities. However, the release of bad news would not necessarily result in abnormal trading of individual investors. In the aspect of investment behaviors, the institutional investors would rather conduct abnormal trading according to news

Table 3. Technical factors and related studies.

Researchers	Factors	Conclusions
Ratner and Leal (1999)	Test 10 VMAs in 10 stock markets in emerging countries in Latin America and Asia.	During 1982 to 1995, the average return of buying signals of VMA trading rules is greater than selling signals.
Lo et al.(2000)	10 technical patterns	5 of the 10 technical patterns are applied in the New York Stock Exchange: head-and-shoulders, broadening bottoms, rectangle tops, rectangle bottoms, and double tops patterns, to win excess returns. In the NASDAQ market, the 10 technical patterns can create excess returns.
Gunasekarage and Power (2001)	Means reversion methods, contrary-opinion rules, follow the smart money rules, other market environment indicators, stock price, and volume techniques	VMA trading methods have predictability in countries such as Bangladesh, India, Pakistan, and Sri Lanka.
Hardouvelis and Peristiani (1992)	Financing amount, daily price and returns, efficiency of margin requirements	It is found that investors reacted rapidly to Type I stocks, while relatively slow and weak to Type II stocks, when the credit conditions of the Japanese stock market changed. The turnover, margin trading, and margin trading accounts would drop, and the variance of daily prices and returns would increase. There is a mutual cause-effect relationship between Margin Purchase and Short Sale balance and price changes.
Karolyi (1999)	Company, individual, foreign, securities company, life insurance company, finance company, and trust.	Entry/exit of foreign investment will create significant impact on the operation of investors.
Schulmeister, (2009)	Apply trend -following models in S&P500 market and contrary models in futures markets.	On such a basis, technical trading with intraday data can improve investment returns.
Marshall et al. (2009)	1850 companies traded in New York Stock Exchange and NASDAQ during 1990 to 2004.	VMA can create excess returns

stories, regardless of good or bad. However, upon the release of information regarding the general economy, both institutional investors and individual investors would conduct abnormal trading.

Chan (2003) tested the stock price changes of 4200 cases of companies in the US market, both with and without news releases, during 1980 to 2000. The findings suggested that, investors reacted moderately to well-known information but would have significant reaction to news not released as expected. In addition, the normal monthly information release and returns had a very weak positive relationship, while news headlines were strongly correlated to turnover ratio. Boyd et al. (2005), using the monthly unemployment information during February 1957 to December 2000, combined with the expansion and contraction of the economy as samples of good and bad news, studied the reaction of stock markets to unemployment rates. The findings suggested that, the

stock returns would be better in an expanding economic environment. In an expanding economy, when bad news appeared in the labor market, the stock prices would rise. On the contrary, in a contracting economic environment, bad news of the labor market would lead to a drop of stock prices.

Asquith et al. (2005) tested the relationship between market reaction and the release of stock analysis reports against the US analysts' reports of "institutional investors" as the subjects.

The study findings suggested that the market reaction toward the price targets of analysts were greater than the reaction to earning predications. It thus can be seen that investors may refer to the recommendations of stock analysts. In addition, investors were found to rely more on the reports of stock analysts when the market was in a downturn trend. Schadler and Eakins (2001) tested the market reaction and performance of holding time of

stocks recommended by Merrill Lynch during February 13, 1990 to December 15, 1998. The findings suggested that, abnormal returns would appear one day prior to the announcement of a selected focus stock of Merrill Lynch. If a company was removed from the focus stock list in advance, then unexpected negative abnormal returns would appear two days before the release of the information. Jaffe and Mahoney (1999) analyzed the performance of investment recommendations by investment newsletters during 1980 to 1996.

The research conclusions pointed out that, investment newsletters tended to recommend stocks of low market value of equity ratio, and the performance of the recommended stocks were not lasting, and usually underperformed the market. Mikhail et al. (2004) discussed the stock picking capabilities of stock analysts. The conclusions pointed out that considerable excess returns would be possible if investors followed the instructions of analysts, when there was a positive relationship with the previous performance of the analysts. In addition, the previous recommendation performance and experience of the analysts can distinguish the recommendation performance regarding the future market. Analysts with more than 5 years of market winnings were better than analysts with good short-term performances.

Holland (2006) pointed out in interviews with the UK's leading fund mangers that, they were faced with unknown and uncertain problems of picking stocks and asset allocations, which were partly due to the limitations arising from financial theories and corporate disclosures, as well as other public information domains. In addition, there are discussions by scholars regarding whether institutional investors have any informational advantages. Chiao et al. (2009) applied intraday data to examine the linkage between investors' order submission behaviors and the opening prices of the top net-trade stocks of professional institutional investors. They found that mutual funds exhibit a more persistent and aggressive trading pattern than foreign investors. The order submissions behaviors of aggressive individuals, closely following mutual funds' trades, mainly drive the observed informational differences. Informational parameters and relevant researches are summarized, as shown in Table 4.

RESEARCH DESIGN

Proposed by the Battelle Association of Geneva in 1971, the method of Decision Making Trial Evaluation Laboratory (DEMATEL) can analyze complex relations of a variety of management problems for the solution and clarification of correlated problems. The purpose of this study is to explore the trading behaviors and judgment patterns of investors using MTS. In addition, this study explores whether indicators of concern are different when investors are constructing trading signal systems for buying/selling stocks by comparing investors using MTS and conventional investors. All indicators are deduced from the definitions of various perspectives based on literature reviews. Indicators between perspectives are on the premise of the assumption of independence.

To establish research perspectives and indicators, this study first

constructs an expert questionnaire. The DEMATEL questionnaire indicators are established based on the significance ratings of three experts (with more than 5 years of MTS experience and more than 10 years of portfolio investment experience. One is a manager of securities trader and two are professional investors). The scores of the three questionnaires are calculated by average score, with scoring standards of 0 (no impact), 1 point (low impact), 2 points (moderate impact), 3 points (high impact) and 4 points (very high impact). Each respondent conducts a significance assessment on 29 perspectives, which indicators include, 1) general economic conditions, 2) industry's overall performance, 3) company's future revenue expectations, 4) company's future profitability expectations, 5) company's future growth expectations, 6) company's past financial indicators performance, 7) company's past profitability, 8) company's past growth, 9) broader market performance, 10) international stock market performance, 11) corporate governance performance, 12) relative market position, 13) price-quantity relative performance, 14) technical indicator performance, 15) technical linear pattern, 16) domestic institutional investors holdings, 17) foreign institutional investors holdings, 18) credit trading standards, 19) directors, supervisors, and corporate insider holdings, 20) treasury shares, 21) proportion of to date write-offs against total volume, 22) personnel adjustments, 23) transfer submissions, 24) news and information, 25) media recommendations, 26) market expert recommendations, 27) investment consultant reports, 28) security dealer analysis reports, and 29) insider news. The operational definitions are defined, as shown in Table 5.

This study is based on the perspectives and indicators above, and applies the DEMETAL method to conduct the expert questionnaire to interview 2 groups of professional securities investors. The 10 professional investors of Group 1 all have more than 3 years using MTS and more than 10 years portfolio investment experience. In the expert sample structure, 4 of mangers of the securities industry, with an average industrial experience of 14 years and 6 are professional portfolio investors. The investment experts of Group 1 are aged on average 44 years old, with an average 12 years of investment experience. The 10 professional investors of Group II have no experience using MTS, but have more than 10 years portfolio investment experience. Two are managers in the securities industry, with an average 16 years of experience and the remaining 8 are professional portfolio investors. The investment experts are aged on average 47 years old with an average 16 years of investment experience.

The DEMATEL method is commonly used to analyze phenomena of high complexities and irregularities in social sciences and studies (Tamura, Nagata, and Akazawa, 2002; Hung, Chou and Tzeng, 2007). It is a significant research tool able to illustrate complex relational structures (Seyed-Hosseini, Safaei and Asgharpour, 2006; Wu and Lee, 2006; Wu, 2007). The DEMATEL method uses expertise to design the framework of a system (Liou, Yen and Tzeng, 2008), and constructs inter-relationships for a variety of variables, according to the specific characteristics of each item (Hung, Chou and Tzeng, 2007), to determine solutions to many problems and strategic selections. The responses and developmental trends in various perspectives of an entire system can be integrated by the DEMATEL method (Hung, Chou and Tzeng, 2007). In this study, the DEMATEL method is applied to determine the characteristics of the trading signal judgment systems of the two types of investors. The DEMATEL method is more appropriate to analyze an expertise based questioner than a large sample survey. The reason is simple, if we focused on an exploratory question. Experienced experts who have acquired sufficient knowledge regarding the discussed issues would be a better group rather than the non-experienced large sample. As an initial effort, the sample size may make sense in an effort to "fine- tune" the model.

Referring to the studies of (Hung, Chou and Tzeng, 2007; Seyed-Hosseini, Safaei and Asgharpour, 2006; Wu and Lee, 2006; Liou, Yen and Tzeng, 2008; Lin and Wu, 2006; Gabus and Fontela,

Table 4. Informational aspect factor-related studies.

Researchers	Factors	Conclusions
Nofsinger (2001)	Stock market trading volumes, security derivatives market trading volumes, corporate-related news, dividends, assets, earning reports, overall economic information.	The nature of the news affects the trading motives of investors. The publication of earning reports can induce higher trading volumes. Institutional investors are relatively insensitive to news coverage.
Chan (2003)	Monthly corporate information, headline(headline news), stock price returns	It is found that investors have relatively less reaction to well-known information, and have overreactions to unexpected information publications. In addition, monthly positive information is slightly positively correlated to returns. However, headline (headline) is strongly correlated to turnover ratio.
Mikhail et al. (2004)	Trading strategy, buy-and -hold strategy, company size, analyst report, stock picking capabilities	The stock picking method recommended by analysts can create excess returns and make profits continuous.
Boyd et al. (2005)	Monthly unemployment, stock returns, and economic outlook signals	In an expanding economy, the stock returns are better. The stock prices will go up when bad news of the labor market appears in an expanding economy. In a contracting economy, the stock prices will go down if bad news in labor market appears.
Asquith et al. (2005)	The content of analyst's reports published in "Institutional investor ", market reaction, publication timing, the reaction to the target prices of the analysts, earning predication.	Reaction of the market to a target price greater than that of the earning predication. In a downturn trend, investors will more trust the reports of analysts.
Holland (2006)	Information, intangible assets, tangible assets, intelligence costs, intelligence advantages	Insider news can significantly create better returns
Chiao et al. (2009)	Institutional investor order submission behavior	Mutual funds exhibit a more persistent and aggressive trading pattern than foreign investors. The order submission behavior of aggressive individuals, follows closely mutual funds' trades, and mainly drives the observed informational differences.

1972), the definition and steps of the DEMATEL method are as follows:

Step 1: Generate a direct-relation matrix. Invite experts and scholars to compare the factors in pairs, in order to understand the relationships between the factor sets, which they designate as having "no impact relationship", "low impact relationship", "moderate impact relationship", "high impact relationship", or "very high impact relationship", which are represented by 0, 1, 2, 3, and 4, respectively. Establish an $n×n$ matrix to represent the relationship strength points. If a_{ij} denotes the impact relationship of (criterion i) and (criterion j), then $A= [a_{ij}]_{n×n}$ will illustrate the precise relationship between the paired factors.

$$A = \begin{bmatrix} 0 & a_{12} & & a_{1n} \\ a_{21} & 0 & & a_{2n} \\ & & & \\ a_{n1} & a_{n2} & & 0 \end{bmatrix}$$

Step 2: Normalize the direct-relation matrix. Normalize Matrix A to produce the normal matrix of X, $X= [x_{ij}]_{n×n}$, and $0 \leq x_{ij} \leq 1$. By Eq. (1) and Eq. (2) treat the diagonal lines of the matrix as 0.

$$s = \frac{1}{\max_{1 \leq i \leq n} \sum_{i=1}^{n} a_{ij}, \max_{1 \leq j \leq n} \sum_{j=1}^{n} a_{ij}} \tag{1}$$

$$X= s×A \tag{2}$$

In this study, X is termed as a normal matrix, as $\lim_{k \to \infty} X^k = [0]$

Step 3: Attain a total-relation matrix. By Eq. (3), add all the relational matrices to produce the total-relation matrix T, then the lower I denote the identity matrix.

$$T= X+X^2+...+X^k = X (I-X)^{-1} \tag{3}$$

Step 4: Produce a causal diagram. Add the columns and rows of the relational matrix T, respectively.

$$T= [t_{ij}], i,j \in \{1,2...n\}, \tag{4}$$

$$r= [r_i]_{n×1} = \sum_{j=1}^{n} t_{ij} \quad _{n×1} \tag{5}$$

$$c= [c_j]_{1×n} = \sum_{i=1}^{n} t_{ij} \quad _{1×n} \tag{6}$$

Where r and c vectors denote the addition of rows and columns, respectively.

Step 5: Obtain the inner dependence matrix. Matrix r denotes the addition of the column values, from the total-relation matrix T and its impact factor is derived from the impact relation between factors i and j. Similarly, matrix c denotes the addition of the row values from the total-relation matrix T and its impact factor is derived from the

Table 5. Assessment Indicators and Operating Definitions.

Number	Assessment Indicators	Assessment Indicators' Definitions
1	general economic conditions	Overall economic situation, such as foreign exchange, interest rate, and employment rate
2	industry's overall performance	Overall industrial outlook and future development expectations
3	company's future revenue expectations	Future business turnover changes
4	company's future profitability expectations	Company's future profitability expectations
5	company's future growth expectations	Company's future growth expectations
6	company's past financial indicators	Company's past financial indicators
7	company's past profitability	Company's past profitability record
8	company's past growth	Company's past growth record
9	broader market performance	Broader market performance
10	international stock market performances	Concurrent international stock market performance
11	corporate governance	Corporate governance recognition, such as the qualifications and legitimacy of the board of directors, independence, and operations .
12	relative market position	Relative position of individual stocks and the market
13	price-quantity relative performances	Price-turnover performance
14	technical indicator performances	Numerical technical index such as RSI, KD, and MACD
15	technical linear patterns	Technical patterns, such as head-and-shoulders, rectangle tops, wave theory, and double tops
16	domestic institutional investors holdings	Increase/decrease of holdings of domestic professional investment institutions, such as securities dealers
17	foreign institutional investors holdings	Increase/decrease of holdings of foreign professional investment institutions
18	credit trading standards	Level of credit trading, such as margin trading by investors
19	directors, supervisors, and corporate insiders holdings	Directors, supervisors, and corporate insiders holdings changes and relative levels
20	treasury shares	Buying treasury shares
21	proportion of date write-off against total volume	Percentage of Day trade
22	personnel adjustments	Adjustment of directors, supervisors, or high-level officials
23	transfer submissions	Transfer submission of directors, supervisors, and insiders
24	news and information	News release concerning individual companies, such as dividend, earning reports.
25	media recommendations	Recommendations of specific stocks by TV, newspapers, or magazines
26	market expert recommendations	Recommendation of well-known investment experts
27	investment consultant reports	Non-security dealer's investment consultant reports
28	security dealer analysis reports	Investment analysis reports by securities dealer
29	insider news	Self-learnt insider news

impact relations between factors i and j. In addition, when $i=j$, then (r_i+c_j) denotes the impact strength. If $(r_i - c_j)$ is positive, it means that factor i tends to impact other factors. Contrarily, if $(r_i - c_j)$ is negative, it means that factor i tends to be affected by other factors. In fact, the value of $(r_i - c_j)$ has more functions and applications than the value of (r_i+c_j), as the value of $(r_i - c_j)$ is a good judgment value in the priority sequencing of multiple choice.

RESEARCH RESULTS

Type I investors

By integrating information of expert and scholar question-naires, the total impact relationship matrix of Type I investors trading signal judgment system, T1, is shown in Table 6. This study uses the quarter potentiometer of total impact relationship matrix T1 of the trading signal judg-ment system (0.07) as the threshold value and delete the items with values below the threshold values, including 8: company's past growth, and 22: personnel adjustments. The related calculation of D, R, D+R, and D-R of trading signal judgment factors of Type I investors is as shown in Table 7.

Type I investor D+R centrality

Greater D+R-values represent greater significance of the

item in the overall assessment factors. There are 16 items having D+R-values greater than the total average of (3.33). The assessment priority sequence of trading signal judgment factors in the case of Type I investors is 5: company's future growth expectations, 4: company's future profitability expectations, 18: credit trading standards, 16: domestic institutional investors holdings, 12: relative market position, 13: price-quantity relative performance, 3: company's future revenue expectations, 15: technical linear pattern, 17: foreign institutional investors holdings, 24: news and information, 25: media recommendation, 14: technical indicator performance, 21: proportion of date write-off against total volume, 9: broader market performance, 26: market expert recommendation, and 19: directors, supervisors and corporate insiders holdings. In addition, the last three items in the D+R (central value) sequence are 10: international stock market performance, 6: company's past financial indicators performance, and 7: company's past profitability. The findings suggest that the relative impact of these three assessment factors on other factors is smaller. Thus, these factors can be regarded as factors of less concern in the stock pick decision-making systems of investors.

Type I investors D-R cause-effect degree

Subtract the row sum from the column sum to determine the D-R value. Greater D-R values represent that the item will directly affect other factors. Otherwise, this item is affected by other factors. The item D-R value sequence indicates the D-R value of 2: industry's overall performance" as 2.39, which is the greatest, positive and most significant value of the overall measurement indicators. This indicates that the item affects others more than being affected. Other indicators of relatively great cause-effect degrees, according to D-R values, are 1: general economic conditions, 9: broader market performance, 7: company's past profitability, and 10: international stock market performance. Indicator with the smallest D-R value is 29: insider news, with a D-R value of 2.59, which represents that the item is, affected the most by other factors.

Type I investors trading signal judgment system assessment factors relationships

According to the total impact relationship matrix of Type I investors trading signal judgment systems, as shown in Table 6 and the relational positions of various items, the relationships of assessment factors of Type I investors trading signal judgment systems are shown in Figure 1. Where, Tij is the impact of Ci on Cj. If Tij<0.15, then no line is drawn, if 0.15 Tij<0.1, then an arrow line is used to represent the relationship, if Tij 0.16, then a bold arrow line is used to represent the relationship. In the structure of the assessment factors affecting the stock picks of investors, items 4, 5 and 18, as shown in the bold frame

in Figure 1, due to their Type I investors D+R (central) being the top three, as shown in Table 2, indicate that 4: company's future profitability expectations, 5: company's future growth expectations, and 18: credit trading standards, are the most important key decision-making assessment factors.

Type 2 investors

By analyzing expert and scholar questionnaires of Type II investors, the total impact relationship matrix of Type II investors trading signal judgment system T2, is shown in Table 8. In this study, the relationship matrix T2 uses the quarter potentiometer (0.07) as the threshold value. The related calculations of D, R, D+R and D -R of trading signal judgment factors of Type II investors, are as shown in Table 9.

Type II investor D+R centrality

Greater D+R-values represent greater significance of the item in the overall assessment factors. There are 14 items having D+R-values greater than the total average of (1.37). The assessment priority sequence of trading signal judgment factors, in cases of Type II investors, are 16: domestic institutional investors holdings, 19: directors, supervisors, and corporate insiders holdings, 17: foreign institutional investors holdings, 5: company's future growth expectations, 4: company's future profitability expectations, 13: price-quantity relative performance, 18: credit trading level, 12: relative market position, 15: technical linear pattern, 14: technical indicator performance, 21: proportion of date write-off against total volume, 3: company's future revenue expectations, 23: transfer submission, and 2: industry's overall performance. In addition, the last three items in the D+R (central value) sequence are 22: personnel adjustments, 29: insider news, and 28: security dealer analysis reports. The findings suggest that the relative impacts of these three assessment factors on other factors is smaller, and thus, these factors can be regarded as factors of less concern in the stock pick decision-making systems of the investors.

Type II investors D-R cause-effect degree

Subtract the row sum from the column sum to determine the D-R value. Greater D-R values represent that the item will directly affect other factors. Otherwise, this item is affected by other factors.

The item D-R value sequence indicates the D-R value of 2: industry's overall performance, as 1.17, which is the greatest, positive and the most significant in the overall measurement indicators. This indicates that the item affects others more than being affected. Other indicators of relatively great cause-effect degree D-R values are 1:

Table 6. The total impact relational matrix T1 of Type I investors stock picking style.

Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
1	0.00	0.04	0.09	0.12	0.12	0.01	0.00		0.07	0.00	0.04	0.09	0.09	0.08	0.09	0.11	0.08	0.11	0.07	0.07	0.09		0.05	0.07	0.07	0.08	0.08	0.07	0.08
2	0.02	0.00	0.12	0.14	0.14	0.01	0.01		0.08	0.02	0.06	0.11	0.12	0.11	0.12	0.15	0.11	0.15	0.09	0.09	0.11		0.07	0.11	0.11	0.12	0.12	0.11	0.12
3	0.00	0.00	0.06	0.13	0.13	0.01	0.01		0.05	0.01	0.04	0.10	0.10	0.10	0.11	0.14	0.10	0.14	0.07	0.08	0.11		0.06	0.10	0.10	0.11	0.11	0.10	0.12
4	0.00	0.00	0.08	0.09	0.14	0.01	0.01		0.05	0.00	0.05	0.12	0.13	0.12	0.13	0.15	0.10	0.15	0.09	0.09	0.12		0.06	0.12	0.12	0.13	0.13	0.12	0.14
5	0.00	0.00	0.12	0.14	0.10	0.01	0.01		0.05	0.00	0.07	0.12	0.13	0.13	0.14	0.16	0.11	0.16	0.11	0.06	0.14		0.09	0.13	0.13	0.14	0.14	0.12	0.15
6	0.00	0.00	0.05	0.05	0.06	0.00	0.02		0.02	0.00	0.04	0.06	0.06	0.05	0.05	0.07	0.04	0.06	0.06	0.06	0.04		0.02	0.06	0.07	0.05	0.08	0.05	0.07
7	0.00	0.00	0.04	0.07	0.06	0.06	0.00		0.02	0.00	0.05	0.05	0.05	0.04	0.05	0.09	0.03	0.08	0.07	0.05	0.04		0.02	0.08	0.08	0.07	0.07	0.06	0.09
8																													
9	0.04	0.03	0.09	0.10	0.11	0.01	0.01		0.04	0.03	0.04	0.11	0.11	0.11	0.12	0.13	0.10	0.13	0.10	0.10	0.13		0.06	0.12	0.12	0.12	0.11	0.10	0.12
10	0.04	0.03	0.06	0.06	0.06	0.00	0.00		0.06	0.00	0.02	0.05	0.07	0.06	0.07	0.06	0.08	0.06	0.04	0.03	0.04		0.02	0.05	0.06	0.06	0.05	0.05	0.06
11	0.00	0.00	0.04	0.04	0.09	0.03	0.00		0.02	0.00	0.02	0.03	0.04	0.04	0.04	0.07	0.08	0.06	0.05	0.06	0.04		0.05	0.07	0.07	0.05	0.05	0.06	0.09
12	0.00	0.00	0.12	0.14	0.14	0.01	0.01		0.06	0.00	0.03	0.07	0.13	0.13	0.14	0.15	0.10	0.16	0.08	0.10	0.11		0.09	0.13	0.13	0.14	0.14	0.12	0.15
13	0.00	0.00	0.10	0.12	0.13	0.01	0.01		0.06	0.00	0.03	0.11	0.07	0.12	0.13	0.14	0.06	0.14	0.08	0.10	0.13		0.04	0.12	0.12	0.13	0.13	0.09	0.14
14	0.00	0.00	0.06	0.08	0.09	0.00	0.00		0.03	0.00	0.02	0.04	0.08	0.05	0.10	0.11	0.04	0.10	0.05	0.04	0.10		0.02	0.04	0.05	0.10	0.10	0.07	0.09
15	0.00	0.00	0.09	0.10	0.10	0.01	0.00		0.04	0.00	0.02	0.09	0.11	0.11	0.06	0.12	0.05	0.13	0.05	0.05	0.11		0.04	0.06	0.08	0.11	0.11	0.09	0.11
16	0.00	0.00	0.10	0.10	0.11	0.01	0.01		0.05	0.00	0.03	0.10	0.10	0.09	0.10	0.08	0.06	0.13	0.06	0.07	0.09		0.04	0.08	0.10	0.10	0.10	0.08	0.12
17	0.00	0.00	0.11	0.13	0.13	0.01	0.00		0.07	0.00	0.07	0.11	0.12	0.11	0.13	0.14	0.05	0.12	0.06	0.06	0.09		0.04	0.12	0.12	0.13	0.13	0.11	0.11
18	0.00	0.00	0.07	0.09	0.10	0.04	0.04		0.05	0.00	0.05	0.08	0.10	0.10	0.10	0.12	0.07	0.08	0.06	0.05	0.12		0.03	0.11	0.11	0.12	0.09	0.08	0.12
19	0.00	0.00	0.07	0.11	0.11	0.01	0.00		0.05	0.00	0.07	0.08	0.06	0.06	0.06	0.09	0.09	0.09	0.04	0.09	0.06		0.08	0.05	0.05	0.06	0.05	0.07	0.09
20	0.00	0.00	0.07	0.08	0.06	0.00	0.00		0.03	0.00	0.04	0.05	0.06	0.05	0.06	0.09	0.03	0.08	0.06	0.03	0.06		0.06	0.08	0.06	0.07	0.07	0.05	0.10
21	0.00	0.00	0.05	0.07	0.07	0.00	0.00		0.04	0.00	0.01	0.06	0.08	0.08	0.07	0.09	0.03	0.10	0.04	0.03	0.04		0.02	0.06	0.05	0.06	0.05	0.05	0.06
22																													
23	0.00	0.00	0.08	0.10	0.10	0.00	0.00		0.03	0.00	0.03	0.06	0.06	0.05	0.05	0.11	0.04	0.09	0.07	0.07	0.07		0.03	0.07	0.07	0.08	0.07	0.06	0.09
24	0.00	0.00	0.07	0.10	0.10	0.01	0.00		0.04	0.00	0.02	0.08	0.09	0.09	0.10	0.12	0.05	0.12	0.05	0.05	0.11		0.03	0.05	0.09	0.09	0.08	0.06	0.11
25	0.00	0.00	0.06	0.09	0.09	0.00	0.00		0.03	0.00	0.02	0.07	0.07	0.07	0.07	0.10	0.03	0.11	0.05	0.03	0.10		0.02	0.07	0.05	0.09	0.07	0.05	0.09
26	0.00	0.00	0.03	0.06	0.06	0.00	0.00		0.02	0.00	0.01	0.04	0.05	0.04	0.06	0.06	0.02	0.08	0.05	0.02	0.08		0.02	0.04	0.04	0.03	0.04	0.04	0.07
27	0.00	0.00	0.04	0.06	0.06	0.00	0.00		0.01	0.00	0.01	0.04	0.04	0.04	0.05	0.06	0.02	0.07	0.03	0.02	0.04		0.01	0.04	0.04	0.04	0.03	0.04	0.06
28	0.00	0.00	0.03	0.05	0.05	0.00	0.00		0.02	0.00	0.01	0.03	0.04	0.04	0.05	0.05	0.02	0.07	0.02	0.02	0.04		0.01	0.02	0.02	0.03	0.04	0.02	0.04
29	0.00	0.00	0.12	0.14	0.14	0.01	0.01		0.04	0.00	0.03	0.10	0.13	0.11	0.12	0.15	0.10	0.15	0.10	0.10	0.12		0.09	0.12	0.12	0.13	0.13	0.12	0.09

Note: indicating that both column and row are larger than threshold value 0.07; the bold indicating being larger than the threshold value 0.07.

general economic conditions and 10: international stock market performance. Indicators with the smallest D- R values are 12: relative market position, 16: domestic institutional investor's holdings and 18: credit-trading standards, with a D-R value of -0.73, representing that the items are the most affected by other factors.

Type II investors trading signal judgment system assessment factors relationship

According to the total impact relationship matrix of the Type II investors trading signal judgment system, as shown in Table 8, as well as the relational position of various items, the relationships of assessment factors of Type II investors trading signal judgment system are shown in Figure 2. Where, Tij is the impact of Ci on Cj. If Tij<0.15, then no line is drawn, if 0.15 Tij<0.1, then an arrow line is used to represent the relationship, if Tij 0.16, then a bold arrow line is used to represent the relationship. In the structure of the assessment factors affecting the stock picks of investors, items 16, 19 and 17, as shown in the bold frame in Figure 1, due to D+R (central) values being the top three, as shown in Table 2, indicate that 16: domestic institutional investors holdings, 19: directors, supervisors and corporate insiders holdings, and 17: foreign institutional investors holdings, are the most important key decision- making assessment factors.

This study uses MTIS experience as criteria to compare the trading signal judgment system composition factors (Table 10). It can be found from the research results that, Type I investors, familiar with MTIS systems compare the trading

Table 7. Type I investors trading signal judgment system D+R and D-R summary.

Column Sum (D)		Row Sum (R)		Correlation D+R		Cause-effect degree D-R	
Item sequence	Value	Item sequence	Value	Item sequence	Value	Item sequence	Value
5	2.67	16	3.02	5	5.44*	2	2.39
12	2.61	18	2.99	4	5.15*	1	1.74
2	2.52	29	2.80	18	5.02*	9	1.26
4	2.50	5	2.77	16	4.95*	7	1.17
9	2.42	4	2.65	12	4.76*	10	1.14
17	2.31	26	2.51	13	4.66*	6	0.94
13	2.30	15	2.44	3	4.32*	8*	0.70
3	2.20	27	2.44	15	4.31*	22*	0.65
18	2.03	21	2.41	17	4.08*	17	0.54
16	1.93	13	2.36	24	4.00*	12	0.46
1	1.88	25	2.35	25	3.81*	23	0.27
15	1.87	24	2.27	14	3.73*	11	0.21
24	1.73	14	2.25	21	3.62*	3	0.08
19	1.61	12	2.15	9	3.58*	13	-0.06
23	1.50	3	2.12	26	3.49*	5	-0.10
14	1.48	28	2.10	19	3.39*	4	-0.15
25	1.46	19	1.78	27	3.31	19	-0.17
20	1.36	17	1.77	20	3.03	20	-0.31
7	1.35	20	1.67	29	3.01	24	-0.54
10	1.25	23	1.23	28	2.84	15	-0.57
6	1.22	9	1.16	23	2.73	14	-0.77
11	1.21	11	1.00	2	2.65	25	-0.89
21	1.21	6	0.28	11	2.21	18	-0.96
26	0.98	8	0.27	1	2.02	16	-1.09
8	0.97	7	0.18	7	1.53	21	-1.20
27	0.87	1	0.14	6	1.50	28	-1.36
22	0.79	22	0.14	10	1.36	26	-1.53
28	0.74	2	0.13	8**	1.24	27	-1.57
29	0.21	10	0.11	22**	0.93	29	-2.59

Note: **indicating that both column and row are not larger than the threshold value 0.07; * indicating that average value is larger than total average value 3.3.

signal judgment system composition factors (Table 10). It can be found from the research results that, Type I investors, familiar with MTIS systems experience, are more concerned with the growth and profitability expectations of individual companies, as well as credit trading standards, as the relatively important factors for consideration. Type II investors, totally unfamiliar with MTIS systems experience, are more concerned with the share holding levels of institutional investors and corporate insiders. Relatively important composition factors of the trading signal judgment systems of the two types of investors include (Table 11), 5: company's future growth expectations, 4: company's future profitability expectations, and other factors of the shareholding aspect. This indicates that the differences in consideration factors of forming trading signals are not significant. However, after cross-checking the first 14 items of trading signal

factors of the two types of investors (Table 12), those with values greater than the average threshold values, there are three factors with differences after removing 11 factors in full compliance. From the perspective of relative importance of composition factors, it is found that the trading signal judgment patterns of the two types of investors differ significantly. Type I investors are relatively more concerned regarding factors of informational aspects, such as 24: news and information, 25: media recommendation and 9: broader market performance; while Type II investors are more concerned about factors of shareholding aspects, including 19: directors, supervisors, and corporate insiders holdings, 23: transfer submission, and 2: industry's overall performance. The results indicate that the two types of investors differ greatly in the fact that Type I investors are greatly concerned over the integration of information, as well as

Table 8. Type II investors trading signal judgment system impact matrix T2.

No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
1	0.00	0.04	0.07	0.08	0.08	0.04	0.04	0.03	0.05	0.00	0.01	0.08	0.05	0.05	0.05	0.08	0.06	0.06	0.04	0.06	0.04	0.00	0.04	0.04	0.04	0.03	0.03	0.03	0.03
2	0.02	0.00	0.07	0.07	0.08	0.04	0.04	0.03	0.03	0.01	0.03	0.06	0.07	0.05	0.05	0.09	0.04	0.05	0.06	0.05	0.04	0.03	0.04	0.03	0.05	0.05	0.03	0.03	0.05
3	0.00	0.00	0.01	0.05	0.03	0.00	0.00	0.00	0.01	0.00	0.00	0.06	0.03	0.02	0.02	0.05	0.02	0.03	0.01	0.01	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
4	0.00	0.00	0.03	0.02	0.05	0.00	0.00	0.00	0.01	0.00	0.01	0.04	0.05	0.04	0.04	0.07	0.03	0.05	0.04	0.03	0.05	0.00	0.04	0.00	0.00	0.01	0.00	0.00	0.01
5	0.00	0.00	0.06	0.06	0.02	0.00	0.00	0.00	0.02	0.00	0.01	0.05	0.05	0.04	0.04	0.07	0.04	0.04	0.04	0.04	0.03	0.00	0.04	0.00	0.01	0.01	0.00	0.00	0.01
6	0.00	0.03	0.05	0.05	0.03	0.00	0.02	0.01	0.01	0.00	0.01	0.05	0.04	0.04	0.05	0.06	0.01	0.05	0.05	0.05	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01
7	0.00	0.01	0.04	0.05	0.04	0.05	0.00	0.03	0.02	0.00	0.01	0.05	0.05	0.05	0.05	0.07	0.01	0.05	0.05	0.04	0.02	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01
8	0.00	0.00	0.03	0.03	0.05	0.04	0.04	0.00	0.01	0.00	0.00	0.04	0.05	0.05	0.05	0.05	0.01	0.05	0.03	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
9	0.02	0.00	0.02	0.03	0.03	0.00	0.00	0.00	0.01	0.01	0.01	0.06	0.04	0.04	0.04	0.05	0.05	0.05	0.04	0.05	0.05	0.00	0.04	0.00	0.01	0.01	0.00	0.00	0.01
10	0.04	0.01	0.04	0.05	0.05	0.00	0.00	0.00	0.04	0.00	0.01	0.03	0.05	0.04	0.05	0.06	0.06	0.03	0.03	0.02	0.04	0.00	0.01	0.00	0.01	0.01	0.01	0.01	0.01
11	0.00	0.00	0.02	0.05	0.06	0.00	0.01	0.00	0.01	0.00	0.01	0.02	0.02	0.02	0.02	0.05	0.06	0.03	0.06	0.06	0.03	0.04	0.05	0.01	0.05	0.03	0.04	0.05	0.06
12	0.00	0.00	0.02	0.03	0.03	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.05	0.05	0.05	0.04	0.02	0.05	0.03	0.04	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
13	0.00	0.00	0.03	0.05	0.04	0.00	0.00	0.00	0.03	0.00	0.01	0.05	0.02	0.05	0.06	0.07	0.03	0.06	0.02	0.02	0.04	0.00	0.01	0.00	0.00	0.00	0.00	0.00	0.01
14	0.00	0.00	0.02	0.03	0.03	0.00	0.00	0.00	0.03	0.00	0.00	0.03	0.04	0.01	0.05	0.06	0.02	0.05	0.02	0.02	0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
15	0.00	0.00	0.02	0.02	0.03	0.00	0.00	0.00	0.02	0.00	0.00	0.05	0.05	0.06	0.02	0.06	0.02	0.05	0.02	0.02	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
16	0.00	0.00	0.05	0.07	0.07	0.00	0.00	0.00	0.03	0.00	0.05	0.07	0.06	0.06	0.06	0.03	0.02	0.06	0.05	0.04	0.06	0.00	0.01	0.00	0.03	0.03	0.03	0.03	0.06
17	0.00	0.00	0.07	0.08	0.08	0.00	0.00	0.00	0.06	0.01	0.05	0.08	0.08	0.07	0.08	0.09	0.02	0.06	0.06	0.03	0.08	0.00	0.02	0.04	0.04	0.04	0.04	0.04	0.05
18	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.04	0.00	0.01	0.05	0.06	0.06	0.06	0.06	0.02	0.02	0.04	0.03	0.06	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
19	0.00	0.00	0.05	0.08	0.07	0.05	0.05	0.05	0.02	0.00	0.05	0.05	0.06	0.05	0.05	0.07	0.05	0.05	0.03	0.06	0.04	0.04	0.04	0.01	0.01	0.01	0.01	0.01	0.06
20	0.00	0.00	0.01	0.04	0.04	0.00	0.00	0.00	0.01	0.00	0.00	0.02	0.01	0.01	0.01	0.03	0.01	0.02	0.03	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.03
21	0.00	0.00	0.01	0.01	0.01	0.00	0.00	0.00	0.02	0.00	0.00	0.06	0.05	0.05	0.05	0.05	0.01	0.06	0.02	0.02	0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.02
22	0.00	0.00	0.02	0.03	0.03	0.00	0.00	0.00	0.00	0.00	0.05	0.01	0.01	0.01	0.01	0.03	0.03	0.01	0.02	0.02	0.01	0.00	0.02	0.00	0.01	0.00	0.00	0.00	0.02
23	0.00	0.00	0.05	0.06	0.07	0.00	0.00	0.00	0.02	0.00	0.01	0.06	0.06	0.03	0.03	0.08	0.02	0.05	0.06	0.06	0.04	0.00	0.01	0.05	0.04	0.05	0.02	0.02	0.06
24	0.00	0.00	0.05	0.04	0.04	0.00	0.00	0.00	0.02	0.00	0.00	0.03	0.03	0.03	0.03	0.06	0.02	0.05	0.01	0.01	0.05	0.00	0.00	0.00	0.05	0.05	0.03	0.02	0.03
25	0.00	0.00	0.02	0.02	0.02	0.00	0.00	0.00	0.01	0.00	0.00	0.01	0.04	0.02	0.02	0.05	0.00	0.05	0.01	0.01	0.05	0.00	0.00	0.00	0.00	0.05	0.04	0.01	0.03
26	0.00	0.00	0.05	0.04	0.04	0.00	0.00	0.00	0.03	0.00	0.00	0.04	0.05	0.04	0.04	0.06	0.01	0.05	0.01	0.01	0.05	0.00	0.00	0.00	0.05	0.01	0.04	0.03	0.03
27	0.00	0.00	0.03	0.05	0.05	0.00	0.00	0.00	0.01	0.00	0.00	0.04	0.05	0.04	0.04	0.05	0.01	0.04	0.01	0.01	0.04	0.00	0.00	0.00	0.00	0.00	0.00	0.02	0.03
28	0.00	0.00	0.04	0.03	0.03	0.00	0.00	0.00	0.02	0.00	0.00	0.02	0.02	0.02	0.02	0.03	0.01	0.02	0.01	0.01	0.02	0.00	0.00	0.02	0.00	0.00	0.00	0.00	0.01
29	0.00	0.00	0.06	0.07	0.07	0.00	0.00	0.02	0.01	0.00	0.01	0.03	0.06	0.04	0.06	0.08	0.03	0.07	0.06	0.05	0.07	0.00	0.01	0.02	0.03	0.04	0.04	0.02	0.01

the relative performance of individual stocks against the market; while Type II investors have relatively greater concerns regarding the share holding changes of corporate insiders, as well as the overall industrial performance as the decision-making method. However, the two types of investors differ insignificantly from the perspective of decision-making composition of cause-effect degree, as both regard 2: industry's overall performance, and 1: general economic conditions, as contributing factors of investment judgment decision-making. However, Type I investors are

Table 9. Stock market investors stock picking styles' D+R and D-R summary.

Column Sum (D)		Row Sum (R)		Correlation degree D+R		Cause-effect degree D-R	
Item sequence	Value	Item sequence	Value	Item sequence	Value	Item sequence	Value
17	1.29	16	1.69	16	2.66*	2	1.17
2	1.27	18	1.33	19	2.05*	1	1.14
1	1.23	4	1.32	17	2.01*	10	0.67
19	1.10	13	1.30	5	1.96*	17	0.57
16	0.97	5	1.27	4	1.95*	23	0.53
23	0.97	12	1.24	13	1.92*	11	0.52
11	0.89	15	1.19	18	1.92*	7	0.50
7	0.73	14	1.13	12	1.75*	8	0.39
10	0.72	21	1.12	15	1.73*	24	0.39
9	0.70	3	1.05	14	1.62*	6	0.38
5	0.69	19	0.94	21	1.56*	22	0.22
26	0.68	20	0.88	3	1.44*	26	0.22
6	0.64	17	0.72	23	1.42*	19	0.16
24	0.64	29	0.66	2	1.38*	27	0.10
4	0.63	9	0.61	1	1.33	9	0.09
13	0.61	25	0.46	9	1.31	25	0.02
18	0.60	26	0.45	11	1.25	28	-0.01
8	0.59	23	0.44	20	1.18	5	-0.58
15	0.53	27	0.41	26	1.13	20	-0.58
12	0.51	11	0.36	7	0.96	29	-0.63
27	0.51	28	0.36	25	0.94	14	-0.64
14	0.49	6	0.26	27	0.92	3	-0.66
25	0.48	24	0.25	6	0.90	15	-0.66
21	0.44	7	0.23	24	0.89	21	-0.67
3	0.39	8	0.20	8	0.79	4	-0.69
22	0.35	22	0.14	10	0.77	13	-0.69
28	0.35	1	0.10	28	0.71	12	-0.73
20	0.30	2	0.10	29	0.69	16	-0.73
29	0.03	10	0.05	22	0.49	18	-0.73

Note: *indicating that the average value is larger than total average value 1.37.

relatively in favor of 9: broader market performance, as the core factor for forming the trading signal (D+R, D-R are both relatively important factors); while Type II investors are more concerned about 10: international stock market performance.

By analyzing the decision-making judgment T matrix factorial relationships that affect the two types of investors, it can be found that, 29: insider news, is a key factor in the trading signal judgment systems of Type I investors (Figure 1). In addition, in the overall consideration of factors, investors regard 16: domestic institutional investors holdings, and 18: credit-trading standards, as factorial indices of trading judgments. Type 2 investors (Figure 2) regard 16: domestic institutional investor's holdings, as a key factor; and regard 17: foreign institutional investor's holdings, 19: directors, supervisors, and corporate insider's holdings for overall considerations

of factors. It can be found from results analysis that the trading judgments of Type I investors are mainly centered on the cross-analysis of information and shareholding changes of institutional and individual investors as key factors of trading signals. The trading judgments of Type II investors are mainly centered on the cross-analysis of shareholding changes, which mainly take advantage of the holding changes of domestic, foreign institutional investors and corporate insiders and form relatively simple trade signal judgment systems.

CONCLUSION AND SUGGESTIONS

The main purpose of this study is to explore whether investors with experience using the MTS order submission platform differ from those investors without such
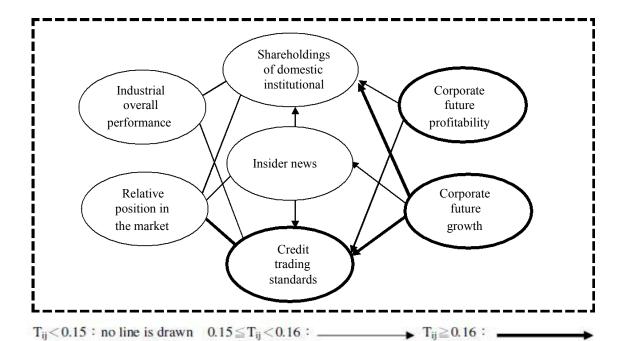
$T_{ij} < 0.15$: no line is drawn $\quad 0.15 \leq T_{ij} < 0.16$: ⎯⎯⎯⎯⟶ $\quad T_{ij} \geq 0.16$: ⎯⎯⟶

Figure 1. Type I investors trading signal judgment system assessment factorial relationship.

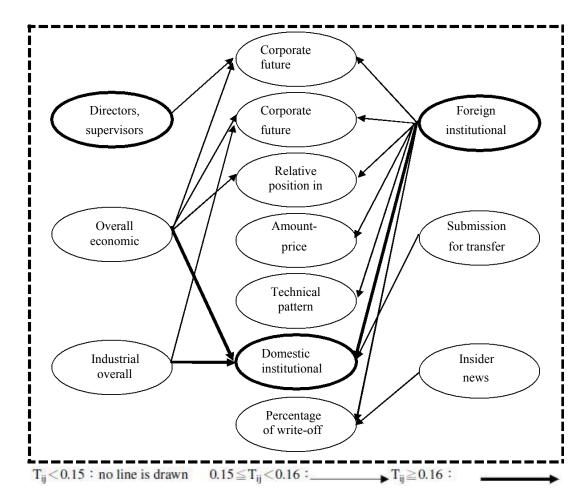$T_{ij} < 0.15$: no line is drawn $\quad 0.15 \leq T_{ij} < 0.16$: ⎯⎯⟶ $\quad T_{ij} \geq 0.16$: ⎯⎯⟶

Figure 2. Type II investors trading signal judgment system assessment factorial relationship.

Table 10. Comparison of D+R (centrality) of Type I and Type II investors.

Type I investors		Type II investors	
(D+R) >0 first three items	(D+R) >0 last three items	(D+R) >0 first three items	(D+R) >0 last three items
5: company's future growth expectations	10:international stock market performance	16: domestic institutional investors holdings	22:personnel adjustments
4: company's future profitability expectations	6:company's past financial indicators	19: directors, supervisors and corporate insiders holdings	29:insider news,
18: credit trading standards	7:company's past profitability	17: foreign institutional investors holdings	28: security dealer analysis reports

Table 11. Comparison of D+R (centrality) of Type I and Type II investors.

Type I investors		Type II investors	
(D-R) >0 first three items	(D-R) <0 last three items	(D-R) >0 first three items	(D-R) <0 last three items
2:industry's overall performance*	29: insider news	2: industry's overall performance*	12: relative market position
1:general economic conditions*	27: investment consultant reports	1: general economic conditions*	16: domestic institutional investors holdings
9:broader market performance	26: market expert recommendation	10: international stock market performance	18: credit trading standards

Note: * indicating having same factors in case of (D-R) >0

Table 12. Comparative study of Type I and Type II investors' first 14 (larger than average (threshold) value) signal factors.

	Type I investors	Type II investors
1	5: company's future growth expectations	16: domestic institutional investors holdings
2	4: company's future profitability expectations	19: directors, supervisors and corporate insiders holdings*
3	18: credit trading standards	17: foreign institutional investors holdings
4	16: domestic institutional investors holdings	5: company's future growth expectations
5	12: relative market position	4: company's future profitability expectations
6	13: price-quantity relative performance	13: price-quantity relative performance
7	3: company's future revenue expectations	18: credit trading standards
8	15: technical linear pattern	12: relative market position
9	17: foreign institutional investors holdings	15: technical linear pattern
10	24: news and information*	14: technical indicator performance
11	25: media recommendation*	21: proportion of date write-off against total volume
12	14: technical indicator performance	3: company's future revenue expectations"
13	21: proportion of date write-off against total volume	23: transfer submission*
14	9: broader market performance*	2: industry's overall performance*

experience, in terms of indicators for the construction of individual selling/buying stock trading signal systems. The characteristics and judgment pattern factors of the trading signal judgment systems of the above two types of investors are explored.

The research findings suggest that the two types of investors differ considerably in trading signal judgment patterns. Type I investors are relatively more concerned regarding factors of informational aspects, while Type II investors are relatively more concerned regarding factors

of the share- holding aspect. The greatest difference of the two types of investors is that Type I investors are very concerned about information integration and the relative performance of individual stocks while Type II investors attach more importance to the changes of corporate insider share ownership and the overall industrial performance as a decision-making basis. The two types of investors differ insignificantly in the cause-effect degree of decision-making factor composition. Regarding the factorial relationship affecting the overall decision-making of the two types of investors, the trading judgments of Type I investors are centered on information cross-analysis and changes of share ownership as key factors for trading signals. The trading judgments of Type II investors are mainly centered on the cross-analysis of share ownership changes, which they use as the basis for overall judgments, forming relatively simple trade signal judgment systems.

The use of mobile technologies has brought investors freedom from site restrictions and easy access to trading information. The use of such technologies by investors affects their trading behaviors and judgment patterns. Investment service providers have substantially developed mobile trading systems in order to enhance the client-end psychological switching costs, as proposed by Ehrlich (2004). Regarding the development and promotion of system services, service providers may take advantage of these research findings and develop better software and analysis systems, as well as more complete and suitable intelligent mobile trading systems by cross-analyzing the needs of investors, in particular, the special needs of news media, media recommendations and share holding changes. Attracting more investors to mobile trading systems would be facilitated by increased and improved client development programs by investment service providers. Conventional investors attach importance to shareholding changes of institutional investors and corporate insiders when making stock buying/selling decisions. It is recommended to strengthen the real time shareholding analysis intelligent software characteristics to attract inexperienced investors in the development of mobile trading systems. In addition, the cause of the differences in the decision-making judgment systems of two types of investors is a combination of considerations of investment decision-making factor sequences and cross-analysis of factors, as the information system has the function of rapid analysis of a large amount of complex factors. Financial consultants may design appropriate training and communication programs for clients that would induce investors to use such mobile trading systems. Hence, providing investors with convenience would result in long-term revenue and profits.

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