Using Software Patent Litigation Data to Identify M&A Targets and Cooperative Partners: Taiwan Automaker Scenario

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Abstract

This paper develops a model for using patent litigation data to find potential M&A and cooperative venture targets. This model is applied to the automotive software sector to identify potential M&A targets for the Taiwanese automotive company Luxgen. Firstly, UPC classes that are highly important to a Luxgen's strategic direction are identified. Then firm-centric reports are generated. Litigation data is supported by other validated indicators of patent value such as citation counts and technology cycle time. Finally, the results are summarized, and the use of litigation data for identifying potential M&A targets and cooperative partners from litigation data is discussed. The results showed that, 141 total and 61 strong potential M&A and cooperative venture targets were found using 2012 litigation data.

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I. INTRODUCTION

Technological change effects the competitive structure in many industries and companies who fail to recognize the potential of emerging disruptive forces can be driven out (Ernst, 2003). Fred Phillips (2011), editor of Forecasting and Social Change recently wrote and published an editorial outlining his perceptions of the current technological paradigm. In his view, the technological development has slowed and social change is outpacing technological change. In his own words, he "believe(s) the socio-cultural effects of cumulated and ongoing technological change are accelerating, even if technological progress itself is slowing". He also points out the employment crisis in Asian countries that have "pushed their universities to world-class levels, turning out graduates who cannot find jobs because manufacturing corporations have not innovated".

The pace of change in the software industry, however, remains faster than other industries (Mann, 2006). New developments in software are constantly changing the way we use devices from ordering food and tickets, shopping online, doing our research, and even shaping the way we interact in business and with family and friends. Software is now facilitating the intermediation of existing hi-tech components such as the automobile, the PC, motion sensors, lasers, GPS, and robotic control into a paradigm changing product known as the 'Google car'; an autonomous vehicle that could potentially reduce highway fatalities to zero before the turn of the next decade. Also, all human-computer interaction is intermediated by software. Is there some connection between a shift to social change and value of software? The fact that software patent grants are an increasing portion of all patent grants, and that software patent litigation is an increasing portion of all litigation indicate that software's value is increasingly important in business.

Although Taiwan's software patenting activity in the USPTO has been far behind its rate of patenting in other areas, software joint ventures are evidently an important part of growth strategy. In 2013, regulators just approved NFC joint venture between major Taiwanese mobile companies and EasyCard Corporation for a $US 6.2 million total investment project. Teco Electrical and Machinery Co, Shining Group, the Industrial Bank of Taiwan, and their Vietnamese partner, Saigon Tel Co. signed agreements in 2008 to build a US $1.2 billion software park in Vietnam. In 2007 Microsoft inked a software deal with Chunghwa Telecom to develop VOIP and business software and Fujitsu joined Taiwan's Institute for Information Industry to jointly develop WIMAX software.

The proposal of this paper is to demonstrate a model for using patent litigation data for finding potential M&A targets or cooperative partnerships denoted as 'growth ventures' (GV). The case study scenario focuses on Taiwanese automaker Luxgen, however, the framework put forth in this study could be modified for any industry or sector for which sufficient litigation data can be found.

II. GENERAL VALIDITY OF PATENT DATA AS A TOOL FOR VALUATION

Patent value indicators are highly valuable as management tools, however, they often need to be refined and designed in order to suit a given firm's applied needs (Reitzig, 2001). Indicators that use patent citations such as current impact index, (CCI), patent citation index (CI) and, technology cycle time (TCT) are important and valid indicators of technological importance, quality, and impact (Wang, 2007; Galasso, 2011; National Science Foundation, Division of Science Resources Statistics, 2007; Karki et al., 1998). Citation based patent value indicators are potent because of the legal function of patents (Galasso, 2011; Wang, 2007; Hall, et al. 2006), and considered an objective measure of technological information (Ernst, 2003; Wang, 2007). For these reasons, patents have been used in many cases as an indirect measure of patent value (Pakes and Griliches, 1980; Hall et al., 2005; Harhoff et al., 2000; Aghion et al. 2009; Breitzman & Thomas, 2002a; Breitzman & Thomas, 2002b), and firm success (Sevilir & Tian, 2011; Galasso, 2011).

Studies that have directly validated patent citations as a measurement of patent value include: Harhoff et al. (1997, 2008) have shown that the sale price of patents is higher for patents with higher citation counts. Carpenter et al. (1981) shows that patents from IR 100 award winning inventions have citation rates twice as high as other patents. Albert et al. (1999) showed that important patents as identified by industry experts were more highly cited, and Deng et al. (1999) showed a correlation between stock market prices and high citation counts. Hirschey & Richardson (2004) found that measures of patent quality; citation index (CI), non-patent references (NPR) and technology cycle time (TCT) have a positive correlation to stock prices. For small-cap firms, cost per patent was about $1.89 million, while large- firms' cost per patent was about $3.42 million among large cap firms. However no difference of quality was noticed between small and large cap firms in the study. However, as Breitzman (2002b) points out "Not every important patent is highly cited, nor is every highly cited patent important", and calls for the development and testing of new techniques for using patent information for strategic management. Patent valuation methods often need to be modified to fit the environment within a specific industry or management application. Also, the use of more than one indicator is advisable to attain a more reliable indication of value (Wang, 2007).

Patent Litigation data has also been used as an indicator of patent value in some studies concerning policy-making and strategic management. Studies regarding citation counts and litigation rates show that highly cited patents are more frequently litigated (Lanjouw and Schankerman, 2001; Su et al., 2012). This correlation gives weight to the notion that litigation data is a valid indicator of patent value although it may sometimes not available until the technology is already available in the market. More evidence regarding the weight of litigation data with regards to patent value is found by (Huang & Tang, 2002) who demonstrate that patent litigation is a leading indicator of market value for high-tech products. According to Huang & Tang's study, litigation incidents have slightly preceded market growth in the PC and cellphone industries since the 1970's. This validation of patent litigation as a leading indicator of market value further justifies the use of litigation data in this study. Being able to identify technology with market value can greatly aid strategic decision-making in the hi-tech industries.

By then combining patent litigation data with additional patent value indicators such as high-citation counts (CI), and low TCT, litigated patents can further be identified as having exceptional value. For example, the software industry's pace of development is more rapid than other industries (Mann, 2006). This means that the timely identification of new technology with significant value is critical for decision management. TCT can identify the pace of change of technology (Kayal, 1999a; Kayal at al., 1999b; Narin, 1993; Breitzman, 2002b). The age of a patent at its time of litigation, and the average age the citations (TCT) for a patent can be used together to indicate the age and pace of the technological paradigm in question. Patents that are only one or two years old at their time of litigation, and that have low TCT, represent emerging technologies and fast moving technologies respectively.

III. IDENTIFYING SOFTWARE PATENTS

In conducting patent data analysis for a specified technology or industry, an initial challenge lies in identifying a complete set of applicable patents. The type of research being conducted determines the acceptable margin of error when classifying patents, and methods exist for estimating the margin of error (Graham, 2003; Bergstra, 2007). In this study the goal is to identify all software patents and litigated patents. Since the Westlaw Litalert provides litigated patent numbers there is no need to consider a method for identifying them. Software patents provide a greater challenge to identify since software itself is often combined with hardware and spans many classifications in both IPC and UPC. A method that is more inclusive, that is, it includes more than software patents is suitable for this study because any hardware be technologically related and have little impact on the final outcome.

A study by Graham (2013), an advisor to the USPTO, has isolated a group of UPC categories that embody software patents. In total, Graham identified numerous subclasses from 82 main UPC classes as roughly comprising software patents. Graham acknowledges that this method is one of convenience but deems it suitable for his research since it is overly inclusive meaning that some of the patents identified are not software patents. Although the UPSTO UPC/IPC concordance table was considered for transposing these UPC classes to IPC classes, this was deemed to be unnecessarily complex in nature since the WIPO has expressed that UPC 'is recognized as an important patent classification internationally' (WIPO, 2004). Also, an overly inclusive group of software patents would be acceptable for this research since these extra patents would have a small effect on large-scale trends.

IV. GROWTH VENTURES IN SOFTWARE AND HI-TECH

4.1 Current Software M&A Trends

The mid-2000s were a boon for software M&A activity. For example, the number of Web-analytics companies decreased from 90 to 10 during the period of 1999-2005 (Park, 2009). Technology M&A activity continues be the number one industry for number of M&A deals as it has for the past decade (PwC, 2012). There were 14,478 total M&A transactions in 2012, and the technology, media, and telecommunications (TMT) sector was the most active globally (mergermarkets, 2013). The constant drive for innovation is a major reason for elevated hi-tech M&A deal volume. Within hi-tech, software application M&As outnumbered other hi-tech sectors in 2011 (PwC, 2012) and the other top sectors were also software intensive such as IT services, and Internet. Table 1 shows the volume and value totals for global hi-tech M&A in 2010 and 2011 (PwC, 2012).

Table 1. Global hi-tech M&A deal volume and value for 2010-2011

	Number of Deals		**Total Value**	
Sector	2010	2011	2010	2011
Software	96	93	28.248	40.77
IT Services	95	51	24.718	19.286
Internet	80	71	13.07	22.896
Hardware	74	53	33.475	17.101
Semiconductor	45	40	7.6	25.059

The strategic transformational changes, which are currently characterizing the software industry, are evident in M&A activity. Cloud computing, security, big data, mobile payment technologies, social networking, and online gaming are the biggest evolutionary technologies and are expected to lead strategic acquisitions in the coming years (PwC, 2012).

The goal of finding potential GV targets for Taiwan companies seems highly justifiable, in light of Asian conglomerate's recent blistering expansion. According to Hirt et al. (2012) estimates, Chinese, Indian, and Korean conglomerates expanded their revenues by well over 10% per year (20% in the case of India and China). About 50% of this growth was largely driven by expansion into business areas that were unrelated to the parent companies previous operations, while approximately 30% of the growth was value chain expansion and 20% category expansion. An example from Chinese company Tencent is their expansion of instant messaging software from personal to corporate service (Hirt et al., 2012). These statistics underscore the fact that expansion into new specialized competencies should be an essential growth strategy for Taiwanese firms.

4.2 Potential of Patent Litigation Data Contribute to M&A Targeting

Breitzman et al. (2002a, 2002b) and Ernst (2003, 2012) report that patent analysis can be used for several aspects of M&A and indicate benefits for increased use of patent information in targeting and due-diligence. Proposed uses for patent data are; targeting firms for M&A, conducting due-diligence decision making assessments, assessing a target firm's technological capabilities, and market-valuation of target firm assets. This study proposes the additional use of patent litigation data to conduct these assessments of identifying potential targets, and improving decision-making capabilities.

V. METHODS AND DATA

The following report-building framework shows how the USPTO data and litigation data were combined in order to create an firm centric indication of value (FCIV) reports for identifying technological value and M&A targets and cooperative partnerships by tracking trends in patent litigation. Reports can be tailored to individual firms' strategic goals. The framework is depicted below in Figure 1.

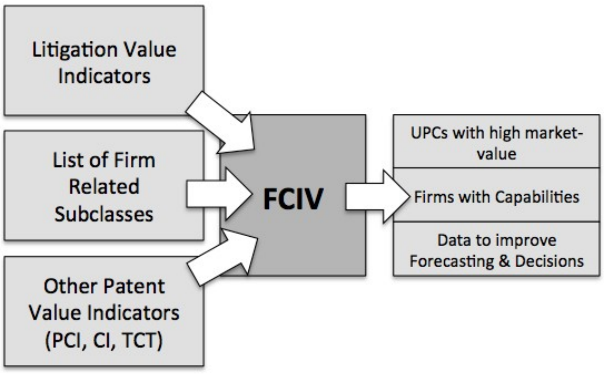

Figure 1. Framework for combining litigation, and other patent value indicators with list of relevant subclasses into a FCIV report

The FCIV reports were designed to highlight high-value UPC software subclasses and identify valuable litigated patents and defendant firms by combining other patent value indicators as discussed in previous sections. Those value-identifying metrics included: patent citation counts (CI), litigated patent TCT, and litigate patent age. By sorting relevant litigated UPC subclasses and patents by other accepted value indicators, firms with the strongest indications of value were pinpointed.

FCIV reports first identify key subclasses for a firm by identifying classes they are actively patenting in, classes that they are considering to patent in or need technology from, and classes from their competitor's patenting activity. FCIV reports identify value in key subclasses, and also potential GV partners by creating lists of defendants who have been litigated within those classes.

After defendants were identified, they were compared against each other, and assessed for suitability as a GV target. Table 2 shows the system used by Breitzman & Thomas (2002b) for comparing potential M&A targets for electronic drug delivery technology using patent data as support metrics. Because the criteria for the "emerging technology" metric were specifically related to electronic drug delivery, it was excluded. For the final model used in this paper, some additional metrics that use patent litigation data were appended to the Breitzman & Thomas's metrics (Table 3). These additional metrics combine the traditional patent value metrics such as patent age, CI, and TCT, with litigation data.

Table 2. Model for examining companies suitability as M&A target by patent portfolios

Indicator Name	Definition
No. of Patents	More than one US patent
Recent Patents	One patent granted 2010-2012
High-Impact Patents	> 1 patent in top citation quintile
Links to Science	Average of 5 non patent references per patent
Emerging Technology	Patent combining iontophoresis with other technologies
Overall	Meets criteria in at least three areas

Table 3. Additional value indicators using litigation data

Indicator Name	Definition
Young Patent	Has been litigated for infringement of at least one patent <5 years old)
Low TCT	Has been litigated for patent with TCT <3
High Impact	Has been litigated for a patent with CI > the UPC subclass average
Multiple Subclasses	Has been litigated in more than one selected UPC subclass

Although firms were valued by their comparing their cumulative performance in all metrics, it should be noted that even firms that may only meet the criteria of one metric may have substantial GV value. Being accused of infringing a young patent, or patent with low TCT both indicate that a firm has capabilities that are emerging technology and has current market value. Being accused of infringement of a high CI patent could imply that a firm has capabilities that are high-impact, and multiple subclasses indicates a firm's capabilities span multiple given UPC classes that are considered highly important. Small but highly specialized firms identified by the FCIV reports, despite only meeting one or no criteria, may still provide high value opportunity through GV relationships.

VI. RESULTS: EXAMPLE SCENARIO SELECTED FOR TAIWAN HI-TECH INDUSTRY

The test scenario for this study is an imagined scenario where Taiwanese car manufacturer Luxgen has decided to look for GV targets to develop their automotive technologies with the goal of developing innovative intelligent vehicle technologies. Luxgen is a new Taiwanese independent auto brand seeking to grow and add market share in Taiwan and abroad. Additionally, Luxgen has shown propensity towards selling intelligent automobiles in a global market. More broadly, autonomous vehicles have been licensed for testing in two US states to date, and Google's Sergey Brin has publically predicted that autonomous vehicles will be ready for market in 5 years. Luxgen is owned by parent company Hon Hai Precision Industry Ltd. Hon Hai has started to accumulate patents related to autonomous vehicles starting in 2010 and their transportation related patent awards and their details are below in Figure 2 and Table 4. Secondly, top litigated software UPC classes for 2012 include several classes related to transportation technology. These litigation trends indicate that technological innovation in the transportation industry is high-value at this time.

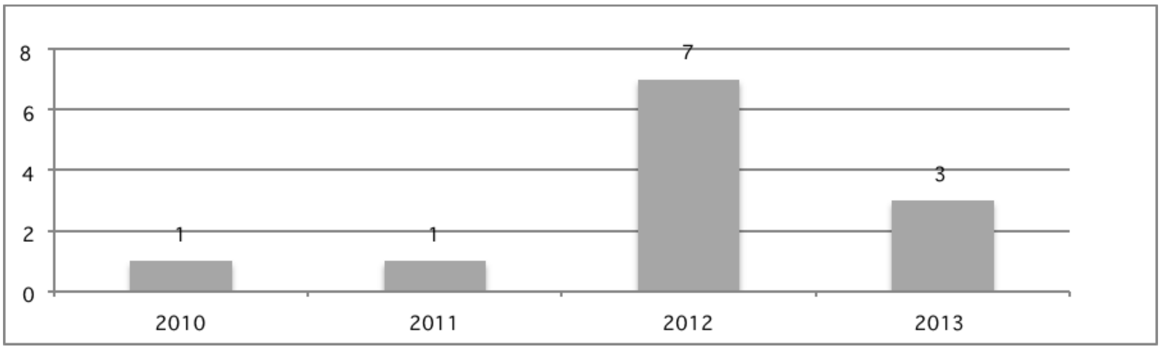

Figure 2. Hon Hai Transportation Related Patent Grants by Award Year

Table 4. Details for Hon Hai's transportation related patents

UPC Subclass	Grant Date	Patent Title
/701/213	2010-09-28	Method for determining positions of contacts
/340/435	2011-08-02	Automatic warning and breaking system for vehicle
/701/23	2012-06-26	System for sensing state and position of robot
/701/213	2012-07-10	GPS device for displaying traffic conditions and method thereof
/701/45	2012-08-07	Vehicle safety system and method with automatic accident reporting
/701/47	2012-08-07	Vehicle safety system and method with automatic accident reporting
/701/28	2012-08-28	Mobile phone and method for selectively sending location update request to cellular network
/701/213	2012-08-28	Mobile phone and method for selectively sending location update request to cellular network

/701/36	2012-12-18	Machine motion control system
/701/2	2013-01-22	Server and method of controlling automated guided vehicles
/701/23	2013-02-05	Robot with an automatic charging function
/701/22	2013-02-12	Sectional electric drive vehicle
/701/213	2010-09-28	Method for determining positions of contacts

The patenting activities of the top ten biggest global auto-manufacturers were used to identify the subclasses to be included in the search for litigation data. In total 2,149 subclasses were identified. After collecting all the 2012 litigation records from those classes, a total of 651 docket numbers and 315 unique patent numbers were identified from these subclasses. From these original findings, the most relevant UPC classes were selected based on closeness of their connection to intelligent auto-design. Finally, only the 2012 litigations from 3 UPC classes, including 18 subclasses (Table 5), 86 docket numbers, and 48 unique patent numbers were included. Two of these three classes were exclusively related to transportation technology and therefore the capabilities of the defendant firms were likely to be automotive-related. The third class included image transformation technology and was included because it related to Hon Hai's existing transportation patent grants, which were determined to use image analysis by reading the abstracts.

Table 5. UPC classes and subclasses selected for Luxgen FCIV report

UPC Class	Subclass	Title
340		COMMUNICATIONS: ELECTRICAL
	426.13	LAND VEHICLE ALARMS OR INDICATORS: Remote control
	426.19	LAND VEHICLE ALARMS OR INDICATORS: Using GPS (i.e., location)
	431	LAND VEHICLE ALARMS OR INDICATORS: For trailer
	435	LAND VEHICLE ALARMS OR INDICATORS: Of relative distance from an obstacle
	441	LAND VEHICLE ALARMS OR INDICATORS: Speed of vehicle, engine, or power train
	445	LAND VEHICLE ALARMS OR INDICATORS: With particular telemetric coupling
	461	LAND VEHICLE ALARMS OR INDICATORS: With particular display means
	988	VEHICLE POSITION INDICATION
382		IMAGE ANALYSIS
	100	APPLICATIONS
	276	Image Transformation or Preprocessing
701		DATA PROCESSING: VEHICLES, NAVIGATION, AND RELATIVE LOCATION
	1	VEHICLE CONTROL, GUIDANCE, OPERATION, OR INDICATION: General

	115	VEHICLE CONTROL, GUIDANCE, OPERATION, OR INDICATION: Specific memory or interfacing device
	117	VEHICLE CONTROL, GUIDANCE, OPERATION, OR INDICATION: Traffic analysis or control of surface vehicle
	301	RELATIVE LOCATOIN: Collision avoidance
	36	VEHICLE CONTROL, GUIDANCE, OPERATION, OR INDICATION: Vehicle subsystem or accessory control
	45	VEHICLE CONTROL, GUIDANCE, OPERATION, OR INDICATION: Control of vehicle safety devices (e.g., airbag, seat-belt, etc.)
	50	VEHICLE CONTROL, GUIDANCE, OPERATION, OR INDICATION: Construction or agricultural-type vehicle (e.g., crane, forklift)
	99	VEHICLE CONTROL, GUIDANCE, OPERATION, OR INDICATION: With indicator or control of power plant (e.g., performance)

In those selected subclasses a total of 141 firms had been litigated in 2012. Figure 3 indicates that 4 subclasses had notably high numbers of litigated patents. A breakdown of the number of patents and litigated defendant firms associated with the selected subclasses is seen in Figure 3. The modified model for evaluating potential GV targets was applied to all firms and the number of firms who passed each criterion is included in Figure 4. After evaluating the cumulative performances, 43% of all potential targets passed at least three of the criteria. Table 6 shows all the firms names and which criteria they each passed.

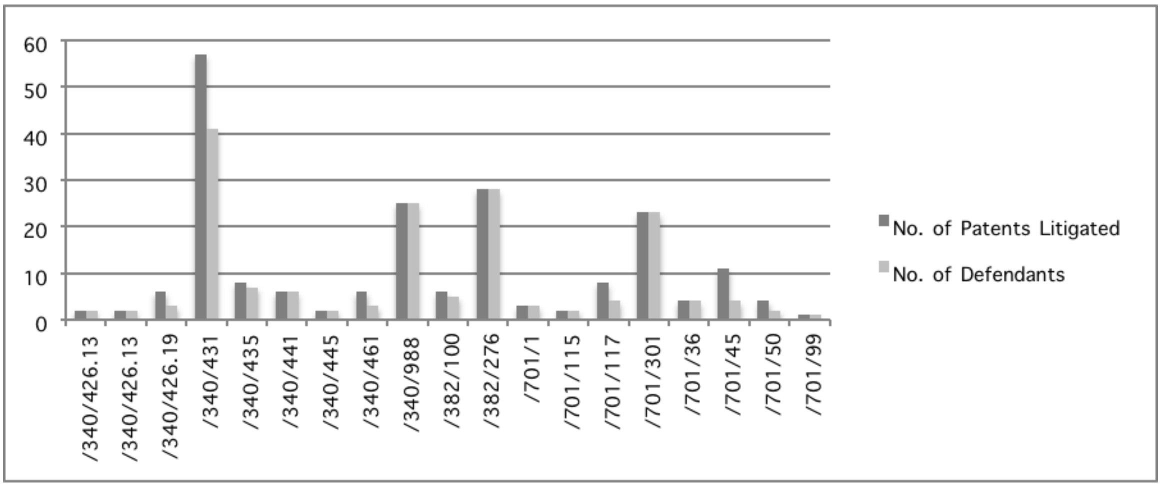

Figure 3. Number of Patents and Defendants Involved in Litigation from Selected Classes in 2012

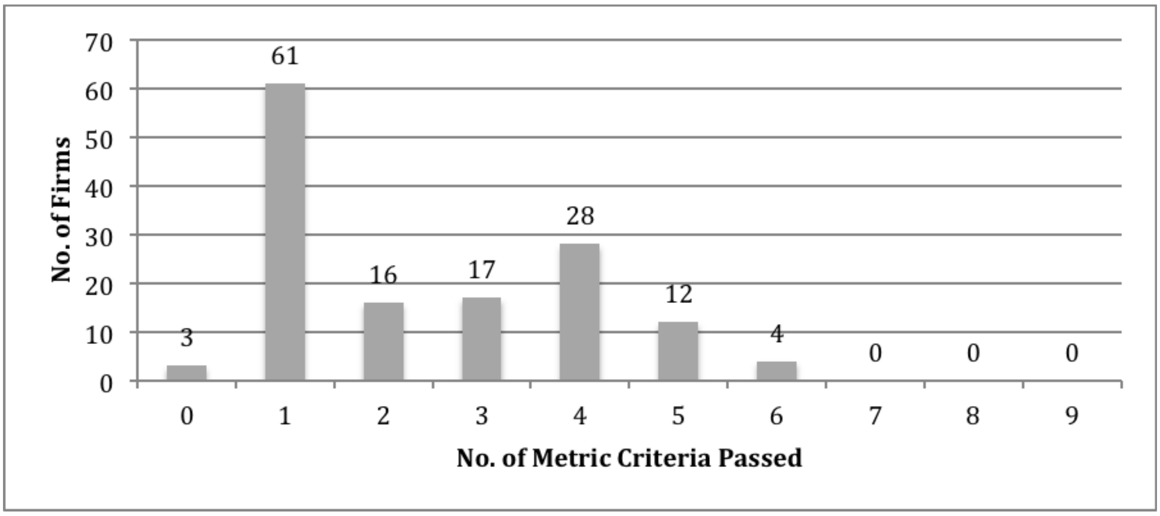

Figure 4. Cumulative metric analysis totals for identified firms

Table 6. Results of the FCIV metric analysis

(1)Inf. Pat.w/ Age <5, (2)Inf. Pat. w/ TCT<3, (3)Inf. Pat.w/ CI>Avg, (4) Inf. Pat. >1 UPC subclass, (5) Firm has >1 pat. gr., (6) Firm has >0 pat. gr. 2011-2012, (7) Firm has >0 pat. w/ CI in top quintile, (8) Firm has Avg>5 non-pat. ref. per pat., (T) Cumulative criteria met

Defendant Name	1	2	3	4	5	6	7	8	T	Defendant Name	1	2	3	4	5	6	7	8	T
ACACIA RESEARCH CORPORATION			*		*	*		*	4	LEAF IMAGING LTD			*						1
ACER AMERICA CORPORATION		*			*	*		*	4	LEICA CAMERA			*		*	*	*		4
AGFAPHOTO HOLDING GMBH			*						1	LENOVO (UNITED STATES) INC		*			*	*	*		4
ALAMO INDUSTRIES INC		*			*	*			3	LG ELECTRONICS INC			*		*	*	*	*	5
ALCATEL-LUCENT USA INC		*			*	*	*	*	5	LINC LOGISTICS COMPANY			*						1
AMERICAN AUTOPARTS INC			*						1	LOOPNET INC			*						1
AMERICOLD LOGISTICS			*						1	MAMIYA DIGITAL IMAGING CO LTD			*		*	*			3
ARCTIC EXPRESS INC			*						1	MAMIYALEAF			*						1
AUDIOVOX ELECTRONICS CORPORATION	*		*		*		*	*	5	MARTEN TRANSPORT LTD			*						1

B AND H FOTO AND ELECTRONICS CORP			*						1	MAZDA MOTOR OF AMERICA INC					*	*	*		3
BEST BUY			*		*				2	MEGAHERTZ TECHNOLOGY INC		*							1
BMW AG	*		*	*	*	*			5	MESION TRUCKING SERVIES INC			*						1
BRISTOL-MYERS SQUIBB COMPANY			*		*	*	*	*	5	MICRO ELECTRONICS INC			*		*				2
CALLPASS TECH INC									0	MIX TELEMATICS NORTH AMERICA		*							1
CANON			*		*	*	*		4	MOBILE LOGISTICS			*						1
CASIO AMERICA INC			*		*	*	*		4	MOBIS ALABAMA			*						1
CDW			*		*	*			3	MOVE INC			*		*	*			3
CHRYSLER GROUP					*	*	*		3	MULTIFAMILY TECHNOLOGY SOLUTIONS INC			*						1
COBRA ELECTRONICS CORPORATION			*		*	*			3	NATIONAL ASSOCIATION OF REALTORS			*						1
CONTINENTAL AUTOMOTIVE SYSTEMS INC	*		*		*	*			4	NESTLE USA INC			*		*	*			3
COOLPAD TECHNOLOGIES INC		*							1	NETWORK COMMUNICATIONS INC			*		*				2
COST PLUS INC			*						1	NEWEGG INC			*						1
COSTCO WHOLESALE CORPORATION			*		*				2	NIKON			*		*	*	*		4
CROWD SOURCED TRAFFIC	*	*	*						3	NMX INC		*							1
CROWN CORK & SEAL USA INC	*		*		*	*			4	OLD DOMINION FREIGHT LINE INC			*						1
CROWN PACKAGING TECHNOLOGY INC	*		*		*	*	*	*	6	OLYMPUS			*		*	*	*		4
DECA INTERNATIONAL CORP			*		*	*			3	ONSTAR	*		*	*					3
DECKER TRUCK LINE INC			*						1	OTTO ENVIRONMENTAL SYSTEMS INC			*						1

DELL INC		*					*		2	OVERSTOCK.COM INC			*					*	2
DEPARTMENT OF Army - USA			*		*				2	PANTECH WIRELESS, INC		*							1
DIGIGRAPH.ME INC	*								1	PAR PHARMACEUTICAL INC			*						1
DIGITECH IMAGE TECHNOLOGIES			*						1	PENSKE LOGISTICS			*						1
DIMENSION TRUCKING SERVICES INC			*						1	PERSONAL COMMUNICATION DEVICES,		*							1
DOES 1-10 INCLUSIVE			*						1	PFIZER INC			*		*	*		*	4
DOMINION ENTERPRISES INC			*						1	PICITUP CORP			*	*					2
DOW CHEMICAL COMPANY			*		*	*		*	4	PRIME INC			*		*	*		*	4
DSC LOGISTICS INC			*						1	PRIMEDIA INC			*						1
E.J. WARD INC		*							1	RAND MCNALLY & COMPANY	*		*		*			*	4
ELECTRONICS FOR IMAGING INC			*		*	*	*		4	REALPAGE INC			*						1
EXCEL INC			*						1	REDFIN CORPORATION			*						1
FEDEX CORPORATION			*	*	*	*	*	*	6	RELIANCE EXPRESS INC			*						1
FERNO-WASHINGTON INC			*						1	RESEARCH IN MOTION LTD			*		*	*	*	*	5
FLEETSAT		*							1	RM ACQUISITION	*		*		*	*			4
FOSTER FARMS			*						1	ROEHL TRANSPORT INC			*						1
FUJIFILM			*		*	*	*		4	SAGEPLAN INC		*							1
GARMIN USA INC			*		*	*	*	*	5	SAMSUNG ELECTRONICS CO LTD			*		*	*	*		4
GENERAL ELECTRIC CO			*		*	*	*		4	SCHENKER INC			*		*				2
GENERAL IMAGING CO			*		*				2	SCHNEIDER NATIONAL INC			*		*				2
GENERAL MOTORS COMPANY				*	*	*			3	SCHRADER ELECTRONICS INC	*		*		*	*			4
GENTEX CORPORATION	*		*	*	*	*		*	6	SCOSCHE INDUSTRIES	*		*		*		*		4
GEOMOTO		*							1	SHAW INDUSTRIES INC			*		*	*			3
H.F. CAMPBELL & SON			*						1	SONY CORPORATION			*		*	*	*		4

INC																			
HASSELBLAD USA INC			*		*				2	SUPERVALU INC			*						1
HTC CORPORATION			*		*	*	*		4	THE WHISTLER GROUP INC			*						1
HUB GROUP INC			*						1	TOMTOM INC	*	*	*	*	*	*			6
HYUNDAI MOTOR CO			*	*			*		3	TOSHIBA INC		*			*	*	*	*	5
IGOCHA GPS									0	TOYOTA MOTOR CORPORATION	*		*	*	*	*			5
INNOVATIVE GLOBAL SYSTEMS	*		*						2	TRACK WHAT MATTERS		*					*		2
INTELLIPHARMACEUTICS CORPORATION	*	*	*		*	*			5	TRANSFREIGHT			*		*				2
IONROAD LTD			*	*					2	TRULIA INC			*						1
J.B. HUNT TRANSPORT INC			*						1	TYCO ELECTRONICS CORPORATION			*		*	*			3
JVC AMERICAS CORPORATION									0	VICTOR HASSELBLAD AB			*						1
KAWASAKI MOTORS CORP U.S.A			*		*	*	*		4	WAZE INC	*	*	*		*	*			5
KIMBERLY-CLARK CORPORATION			*		*	*	*	*	5	WEL COMPANIES INC			*						1
KNIGHT TRANSPORTATION INC			*						1	X5 GPS TRACKING		*							1
KNYRIM, JORG			*						1	XEROX CORPORATION			*		*	*		*	4
KOMATSU AMERICA INCORPORATED			*	*	*	*			4	YAMAHA MOTOR CORPORATION USA			*		*	*			3
KONICA MINOLTA INC			*		*		*		3	ZACHRICH TRUCKING INC			*						1
KRAFT FOODS GLOBAL INC			*		*	*		*	4	ZILLOW INC			*						1
KYOCERA COMMUNICATIONS INC		*			*	*	*		4	ZIPREALTY INC			*						1
LASSO TECHNOLOGIES		*							1										

VII. CONCLUSION

The framework designed for this study helped to identify 4 software UPC subclasses which show particularly high value indicated by high number of litigations, and 141 firms who could be considered M&A targets or cooperative venture for the Taiwanese intelligent automaker Luxgen. Of those 141 target firms, 61 showed strong value when analyzed using the patent value metrics. Even firms who scored low on the cumulative metric analysis may be potentially valuable GV partners. This framework can be modified to fit individual firm or industry nuances. Further study of the validity of litigation based patent value indicators, and traditional patent value indicators is warranted.

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