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A New Framework to Approach to COVID-19 Pandemic using Serious Intelligent Assets Discoveries

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ABSTRACT

A pandemic calls for large-scale action across national and international innovation systems in order to mobilize resources for developing and manufacturing crisis-critical products efficiently and in the huge quantities needed. Nowadays, these products also include a wide range of digital innovations. Given that many responses to the pandemic are technology driven, stakeholders involved in the development and manufacturing of crisis-critical products are likely to face intellectual property (IP)- related challenges. To (governmental) decision makers, IP challenges might not appear to be of paramount urgency compared to the many undoubtedly huge operational challenges to deploy critical resources. However, if IP challenges are considered too late, they may cause delays to urgently mobilize resources effectively. Innovation stakeholders could then be reluctant to fully engage in the development and manufacturing of crisis-critical products. This article adopts an IP and innovation perspective to learn from the currently unfoldingCOVID-19 pandemic using secondary data, including patent data, synthesized with an IP road map.We focus on technical aspects related to research, development, and up scaling of capacity to manufacture crisis-critical products in the huge volumes suddenly in demand. In this article, we offer a set of contributions. We provide a structure, framework, and language for those concerned with steering clear of IP challenges to avoid delays in fighting a pandemic. We provide a reasoning why IP needs to be considered earlier rather than too late in a global health crisis. Major stakeholders we identify include 1) governments; 2) manufacturing firms owning existing crisis-critical IP (incumbents in crisis-critical sectors); 3) manufacturing firms normally not producing crisis-critical products suddenly rushing into crisis-critical sectors to support the manufacturing of crisis-critical products in the quantities that far exceed incumbents' production capacities; and 4) voluntary grass root initiatives that form during a pandemic, often by highly skilled engineers and scientists in order to contribute to the development and dissemination of crisis-critical products. For these major stakeholders, we draw up three scenarios, from which we identify associated IP challenges they face related to the development and manufacturing of technologies and products for 1) prevention (of spread); 2) diagnosis of infected patients; and 3) the development of treatments. This article provides a terminology to help policy and other decision makers to discuss IP considerations during pandemics. We propose a framework that visualizes changing industrial organizations and IP-associated challenges during a pandemic and derive initial principles to guide innovation and IP policy making during a pandemic. Obviously, our findings result only from observations of one ongoing pandemic and thus need to be verified further and interpreted with care.

I. INTRODUCTION:

IN DECEMBER 2019, an outbreak of a novel corona virus in Wuhan, Hubei province, China, manifested itself as a global health tragedy. The World Health Organization (WHO) announced it as a public health emergency of international concern on January 30, 2020 [1] and as a pandemic on March 11, 2020 [2]. The virus, later named SARS-CoV-2 [3], can cause mild flu-like symptoms (or even be asymptotic) but can progress to acute pneumonia-like respiratory illness called novel corona virus-infected pneumonia (NCIP). The overall clinical Syndome is known as COVID-19 [4].

Until today, there are no vaccines or medical cure for the disease yet [5], and the disease has a fatality rate that is unconfirmed due to lack of testing

data for many countries but is likely to be around or above 1% [1]. In just less than six months since its emergence, the virus is affecting more than 212 countries, with more than 4 million confirmed cases worldwide [2]. The virus has a stronger transmission capacity than the "conventional" annually recurring flu. On average, without social distancing measures in place, one infected person passes the virus to 2–2.5 others (that range is subject to change and can vary largely by geography, age group, and time) [8], [9]. The current COVID-19 pandemic creates enormous demand surges for products that are crisis relevant as well as a need for rapidly developing innovations to address crisis-specific problems.

Innovation efforts require pooling of and repurposing of resources, capabilities, and capacities from actors owning relevant or capable of creating new intellectual property (IP) to develop these crisis-critical innovations. The literature that investigates IP challenges during times of global crisis appears very limited (see, e.g., [3]). A limited number of papers focus on IP challenges during economic crises, such as the global financial crisis in 2008–2009. During that crisis, strong IP protection was found to be beneficial for companies to recover, e.g., through facilitating collaboration, IP monetization, licensing, and the use of IP as collateral [4], [5]. Another small set of papers actually focuses on global health crises (see, e.g., [6] [11]).

Most authors, however, focus on crises that unfold much slower than the current COVID-19 pandemic, such as the HIV/AIDS pandemic. For ending the global HIV/AIDS pandemic, IP rights were found to be a barrier for low-income countries to access HIV/AIDS medicines after they became available [7], [12]. As a consequence, parallel import options and compulsory licensing were introduced at the international level to relax IP restrictions on essential medicines [6], [7]. Existing literature also studies compulsory licensing [6], [7], changes to patent laws, such as fast track grant procedures [6], "western subsidies" [8], restricted patentability standards, and patent pools involving voluntary nonexclusive licenses among private innovators (e.g., UNITAIDS Medicine Patent Pool) [9], [10]. While these papers undoubtedly discuss topics that are potentially relevant to the COVID 19 pandemic (compulsory licensing has already been enacted by a few countries), findings from those papers must be treated carefully and should not be overly generalized to the COVID-19 pandemic.

The current pandemic spreads so much faster than the global health crises studied in prior literature. However, two general conclusions can be drawn from prior literature focusing on IP in the context of crises that are very much in line with what is known from extensive economic research on IP and innovation. First, IP seems to play a role as an innovation incentive; second, IP needs to be considered for accessing crisis-critical products (CC-P), such as vaccines and treatments. We can thus conclude that the existing literature hardly provides suitable frameworks, terminology, evidence, and guidance for (governmental) decision makers to make informed choices to best utilize IP, and to steer clear of IP associated challenges and risk during and beyond global crises. This article aims to contribute to the many efforts to contain the pandemic as quickly as possible. We offer a set of contributions with two primary purposes.

First, we hope we contribute reasoning on why IP considerations need to be addressed early rather than later during a pandemic. Second, we provide a structure (if not conceptual framework) that is hopefully helpful or those concerned with steering clear of IP challenges, e.g., policy makers, governments, international organizations, large IP owners, new entrants, and many voluntary initiatives that are part of the grassroots movement. This article focuses on three critical areas for fighting pandemic, all of which are technology dependent: 1) the prevention (including measures to limit its spread and vaccines to prevent future outbreak); 2) diagnosis (including professional and self-testing); and 3) treatment, with the latter including the direct treatments (e.g., development of drugs) and the treatment of symptoms, i.e., related to the medical equipment needed to keep bodies alive (e.g., ventilators and intensive care unit (ICU) beds). Deriving findings from secondary data of the COVID-19 pandemic, including patent data, this article contributes a structure, framework, and language for those concerned with steering clear of IP challenges to avoid delays in fighting a pandemic.

We identify relevant stakeholders and describe associated IP challenges they face related to the development and manufacturing of technologies and products for prevention (of spread), diagnosis of

infected patients, and the development of treatments summarized in an adopted IP roadmap. Major innovation stakeholders we identify include the following: 1) governments; 2) manufacturing firms owning existing crisis-critical intellectual property (CC-IP) [incumbents in crisis-critical sectors (CC-S)]; 3) manufacturing firms normally not producing CC-P suddenly rushing into CC-S to support the manufacturing of CC-P in the quantities that far exceed incumbents' production capacities; 4) voluntary grass root initiatives that form during a pandemic, often by highly skilled engineers and scientists in order to contribute to the development and dissemination of CC-P.

Particularly, new relationships that are formed rather suddenly during a pandemic appear to be associated with various IP related uncertainties with the particular problem that negotiating licensing agreements is typically time consuming and that new IP emerges during the pandemic, which can be owned by new entrants. This article provides a terminology that (hopefully) supports (governmental) decision makers to discuss IP considerations during pandemics that call for urgent and large-scale actions from innovation stakeholders. We propose a framework that visualizes changing industrial organizations and IP associated challenges during a pandemic and derive initial guiding principles for innovation and IP policy making during times of a pandemic. Those can also serve as an analytical framework for others and particularly for follow-up studies. Obviously, our findings result only from observations of one ongoing pandemic and thus need to be verified further and interpreted with care.

II. EXISTING SYSTEM:

- The literature that investigates IP challenges during times of global crisis appears very limited (see, e.g., [3]). A limited number of papers focus on IP challenges during economic crises, such as the global financial crisis in 2008–2009. During that crisis, strong IP protection was found to be beneficial for companies to recover, e.g., through facilitating collaboration, IP monetization, licensing, and the use of IP as collateral [4], [5]. Another small set of papers actually focuses on global health crises (see, e.g., [6]–[11]).
- Most authors, however, focus on crises that unfold much slower than the current COVID-19 pandemic, such as the HIV/AIDS pandemic. For ending the global HIV/AIDS pandemic, IP rights were found to be a barrier for low-income countries to access HIV/AIDS medicines after they became available [7], [12]. As a consequence, parallel import options and compulsory licensing were introduced at the international level to relax IP restrictions on essential medicines [6], [7].
- Existing literature also studies compulsory licensing [6], [7], changes to patent laws, such as fast track grant procedures [6], "western subsidies" [8], restricted patentability standards, and patent pools involving voluntary nonexclusive licenses among private innovators (e.g., UNITAIDS Medicine Patent Pool) [9], [10]. While these papers undoubtedly discuss topics that are potentially relevant to the COVID-19 pandemic (compulsory licensing has already been enacted by a few countries), findings from those papers must be treated carefully and should not be overly generalized to the COVID-19 pandemic.
- The current pandemic spreads so much faster than the global health crises studied in prior literature. However, two general conclusions can be drawn from prior literature focusing on IP in the context of crises that are very much in line with what is known from extensive economic research on IP and innovation.

Disadvantages

- In the existing work, the system is not accuracy due to lack of understanding about the corona virus and its early identification.
- This system does not aim to contribute to the many efforts to contain the pandemic as quickly as possible.

III. PROPOSED SYSTEM:

- The proposed system is develop to contribute to filling the knowledge gap concerning IP considerations during pandemics, we deploy an exploratory method
- [13] employing an IP and innovation perspective. One could argue that we treat the COVID-19 pandemic as a single longitudinal case study [14], [15] to make better informed decisions during this, but also future global health crises. Our findings are based on secondary data collected during the ongoing COVID-19 pandemic. The data include publicly available documents, such as news articles, government announcements, press releases, industry reports, and patent data.
- The proposed system also complement our analysis of secondary data with a patent analysis for the severe acute respiratory syndrome (SARS) Corona virus, where we make use of the open patent data sets compiled by Lens.org,1 to enhance our understanding into preventive, diagnostic, and treatment measures. We focus on the broader spectrum of corona viruses to identify patterns from earlier outbreaks that could be applied in the case of SARS-Cov-2.
- We use the data set compiled by Lens.org "Corona virus: Broad Keywords Based Patents" and extract all the related patent information.2 We choose to focus on the keywords to capture a large variety of corona virus-related patents, in a time of high uncertainty, to improve our overall understanding.

Advantages

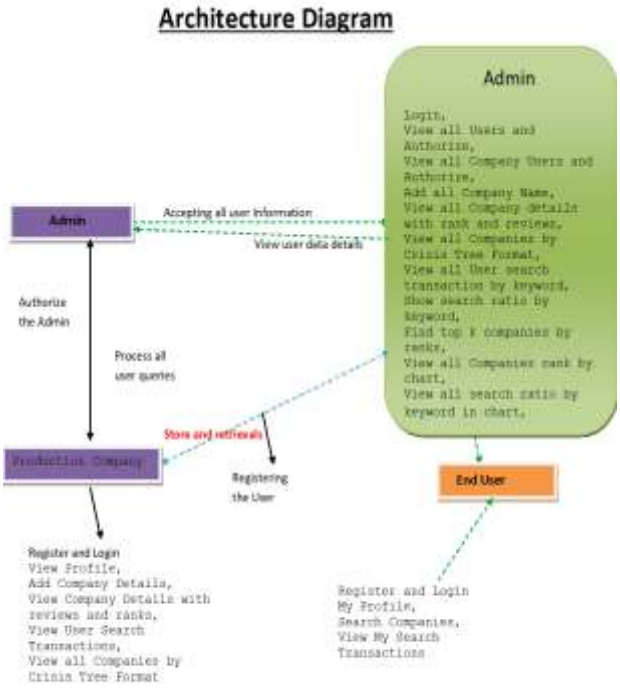
1) Prevention (reducing the spread, including vaccine development),

2) Diagnosis (increase our understanding about the corona virus and its early

identification using test kits or symptom identification), and

3) Treatment (treatment development of the acute respiratory pneumonia caused by COVID-19, with a preventative vision).

IV. SYSTEM ARCHITECTURE:



V. MODULES:

Admin

In this module, the Social Network has to login by using valid user name and password. After login successful he can do some operations such as Login,
View all Users and Authorize, View all Company Users and Authorize,
Add all Company Name, View all Company details with rank and reviews, View all Companies by Crisis Tree Format, View all User search transaction by keyword, Show search ratio by keyword, Find top k companies by ranks, View all Companies rank by chart, View all search ratio by keyword in chart,

View and Authorize Users

In this module, the admin can view the list of users who all registered. In this, the admin can view the user's details such as, user name, email, address and admin authorizes the users.

Production Company

In this module, there are n numbers of users are present. User should register before doing any operations. Once user registers, their details will be stored to the database. After registration successful, he has to login by using authorized user name and password. Once Login is successful user will do some operations like View Profile, Add Company Details, View Company Details with reviews and ranks, View User Search Transactions, View all Companies by Crisis Tree Format.

End Users

In this module, there are n numbers of users are present. User should register before doing any operations. Once user registers, their details will be stored to the database. After registration successful, he has to login by using authorized user name and password. Once Login is successful user will do some operations like View My Profile, Search Companies, View My Search Transactions.

VI. SYSTEM SPECIFICATION:

H/W System Configuration:-

- Processor - Pentium –IV
- RAM - 4 GB (min)
- Hard Disk - 20 GB
- Key Board - Standard Windows Keyboard
- Mouse - Two or Three Button Mouse
- Monitor - SVGA

Software Requirements:

- Operating System - Windows XP
- Coding Language - Java/J2EE(JSP,Servlet)
- Front End - J2EE

Back End - MySQL

VII. CONCLUSION:

From an IP and innovation perspective, this article contributed to the scarce literature about the role of and challenges associated with IP during pandemics. Our findings were derived from analyzing, synthesizing, and interpreting secondary data from the COVID-19 pandemic from two major sources: 1) publicly available documents, such as newspaper articles, industry specific outlets, government reports, and announcements and 2) patent data. Obviously, our findings result only from observations of one ongoing pandemic and thus need to be verified further and interpreted with care. We find that what makes it difficult for IP to be given its required considerations during the early stage of a pandemic is the enormous sense of urgency, which draws decision makers' attention to huge and undoubtedly urgent operational challenges.

With this article, we hopefully contribute a set of arguments to raise awareness why IP needs to be dealt with earlier rather than later during a pandemic in order to avoid that IP-associated risks delay the mobilization of the resources so urgently needed for the research, development, and mass manufacturing of CC-P. This is particularly important as various responses to the pandemic are somehow technology related, which typically involves IP rights in some form. This article offered a set of contributions.

We summarized IP-related issues currently surfacing during the COVID-19 pandemic in a CC-IP roadmap. We identified four major groups of stakeholders that are mostly concerned with IP considerations. These include governments (and intergovernmental organizations, such as the WHO and WIPO) who are called upon to orchestrate pandemic responses, incumbent manufacturing firms in CC-S, as well as new entrants that enter CC-S to

assist incumbents. New entrants include manufacturing firms that did not produce CC-P prior to a pandemic (Type 1 entrants), as well as voluntary grass root initiatives, start-ups, entrepreneurial scientists, etc. (Type 2 entrants). This article then identified and analyzed three scenarios in which different IP considerations emerge for the different stakeholder groups.

This article provided a terminology that helped to conceptualize IP considerations in times of pandemics or global health crises that call for urgent and large-scale actions from various innovation stakeholders that suddenly find themselves engaged in new relationships that are associated with various IP associated uncertainties, not the least related to the use and sharing of IP with the particular problem that negotiating licensing agreements is typically time consuming. We also provided a language for policy makers and other decision makers to articulate and discuss IP challenges during pandemics, which might evolve further with specific terms being added gradually or notions being revised as we go along. We proposed a framework that visualizes how industrial organization could change throughout pandemics. That can serve as an analytical framework for other and particularly follow up studies.

Results from our patent analysis show that research and IP protection for corona virus-related inventions is not new. Patent protection for different forms of corona virus already exists, but not for the particular corona virus type SARS-CoV-2 that causes the COVID-19 disease. It appears evident that there is a time lag between outbreaks and the materialization of patents and a number of references to NPL, which shows the urgency of scientists for open data to put the information in the public domain. Any patent analysis is historic, thus limited to existing IP, even with a delay as patent applications get published 18 months after filing. Any patent analysis thus does not capture innovations currently being developed, even though these might result in patent applications, with some of them possibly even having been submitted. Following a systematic identification of CC-P, further specific patent analysis should be conducted to learn more about the owners of IP related to those, which can then, e.g., inform policy makers and help owners of CC-IP to form consortia with others who own complementary IP and identify opportunities for further repurposing of production capacities.

For policy and decision makers, we provide a summary of approaches to address IP concerns during the COVID-19 pandemic, such as compulsory licensing, IP pooling, and IP pledges. We derive initial guiding principles for policy makers toward using IP to maximize innovation incentives for CC-P until these are developed and then shift gradually to use policy measures to facilitate access to these key innovations, such as the vaccine. These should be subject to future scrutiny and needs further work to identify relevant literature from innovation economics. A more advanced IP risk analysis would be helpful to understand the risks for relevant stakeholders during the different pandemic phases, i.e., before/after certain key innovations have been developed, which could then provide relevant input to appropriate policy responses.

In fact, currently, we lack systematically collected evidence documenting the extent to which IP issues actually present a barrier or are a perceived possible future problem (risk) and to what extent for different actors. Evidence for this could be created for instance through a survey to those developing and manufacturing CC-P. This would provide a more sound basis for conversations with decision makersabout the importance of IP issues during a pandemic.

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