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PhD Viva

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The regulatory environment for outer space activities has changed from space monopoly to space commercialization, which certainly requires a proper intellectual property ("IP") legal regime. Yet, the IP international treaties have not explicitly considered the issue of IP protection in outer space in their provisions. In the provisions of the five outer space treaties, none clearly address IP, either. This has substantially discouraged States and private entities from engaging in space activities. The objective of this thesis is to provide a regulatory approach that would allow the application of IP to outer space activities in a pragmatic, enforceable and feasible manner. It is argued that the construction of a new IP legal regime specifically for outer space is unlikely to succeed as this approach lacks a solid theoretical foundation. Nevertheless, Article VIII in the Outer Space Treaty can be legitimately employed as a means of deviation to indirectly permit the protection of IP in space under the existing international legal framework. Such an approach is considered to be the alternative regulatory one which is not only more pragmatic, enforceable and feasible, but can properly address the current and near-term needs of space development. This thesis also investigates the unique legal features of patent and copyright protection in outer space. The two branches of IP legal regime require specific legal analysis under the context of space commercialization.

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Even though there is a rapidly increasing importance of trade in services, not enough attempts have been made to clarify the ambiguities in the GATS provisions yet. Meanwhile, with the fast growing number of BITs and related arbitrations, more discussions on the cross-cutting issues have taken the place in the international investment context. Despite their different elements, sources and procedures of rule development, international investment law has the potential to contribute to the interpretation of the GATS. Practically, international trade and investment regimes have inevitable overlaps as shown by negotiating history. Due to this relevance, there are some cross-cutting issues between the two regimes. The contribution would be possible if the WTO adjudicating bodies recognizes that the international investment law is the "relevant rues of international law" and the common rules generally included in the various BITs among the WTO members are to be seen as the 'common understanding' according to the ILC's interpretation of VCLT Article 31(3)(c). Also, the 'common understanding' formulated by the majority of WTO Members can also be suggested in the WTO through the legislative process such as the authoritative interpretation or the amendment. Along with the convergence of the GATS and the investment regime, the harmonization with the international investment law is likely to be inspired in the future negotiations of the WTO. At least, any suggestion from the WTO members based on the lessons from the investment regime itself would still contribute to the future development of the 'common understanding' among the WTO Members.

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In applying the current law of armed conflict to activities performed in or through cyberspace, this dissertation argues that the law should be interpreted and applied in light of the status of data in the digital age. Beginning with the perspective of *jus ad bellum*, this research seeks to examine whether cyber operations targeting data can be regarded as use of force under the Article 2(4) of the UN Charter, and whether the inherent right of self-defence is allowed to repel cyber armed attacks targeting data. In applying the concept of use of force to cyber operations, this paper, adopting the effects-based approach which focuses on the effects of those operations, argues that non-physical effects on data itself should also be taken into account.

In view of *jus in bello*, this study mainly focuses on the following observations. Firstly, the traditional interpretation on 'object' which requires tangibility should be re-examined taking into account the intangible nature of data in the digital age. Secondly, in order to protect civilian data from cyber attacks pursuant to the principle of distinction, the concept of 'attack' should be applied in the way that the breaches of intangible data can be corresponding to the destruction of tangible objects.

In order to protect data from cyber operations under the law of armed conflict, this dissertation proposes to adopt subsequent agreements which reflect how main concepts under the law of armed conflict should be interpreted and applied. Those agreements are to be considered together with the context of treaties constituting the law of armed conflict. In order to develop such agreements, it is necessary to promote common understandings among States on how the law of armed conflict applies to cyber operations.